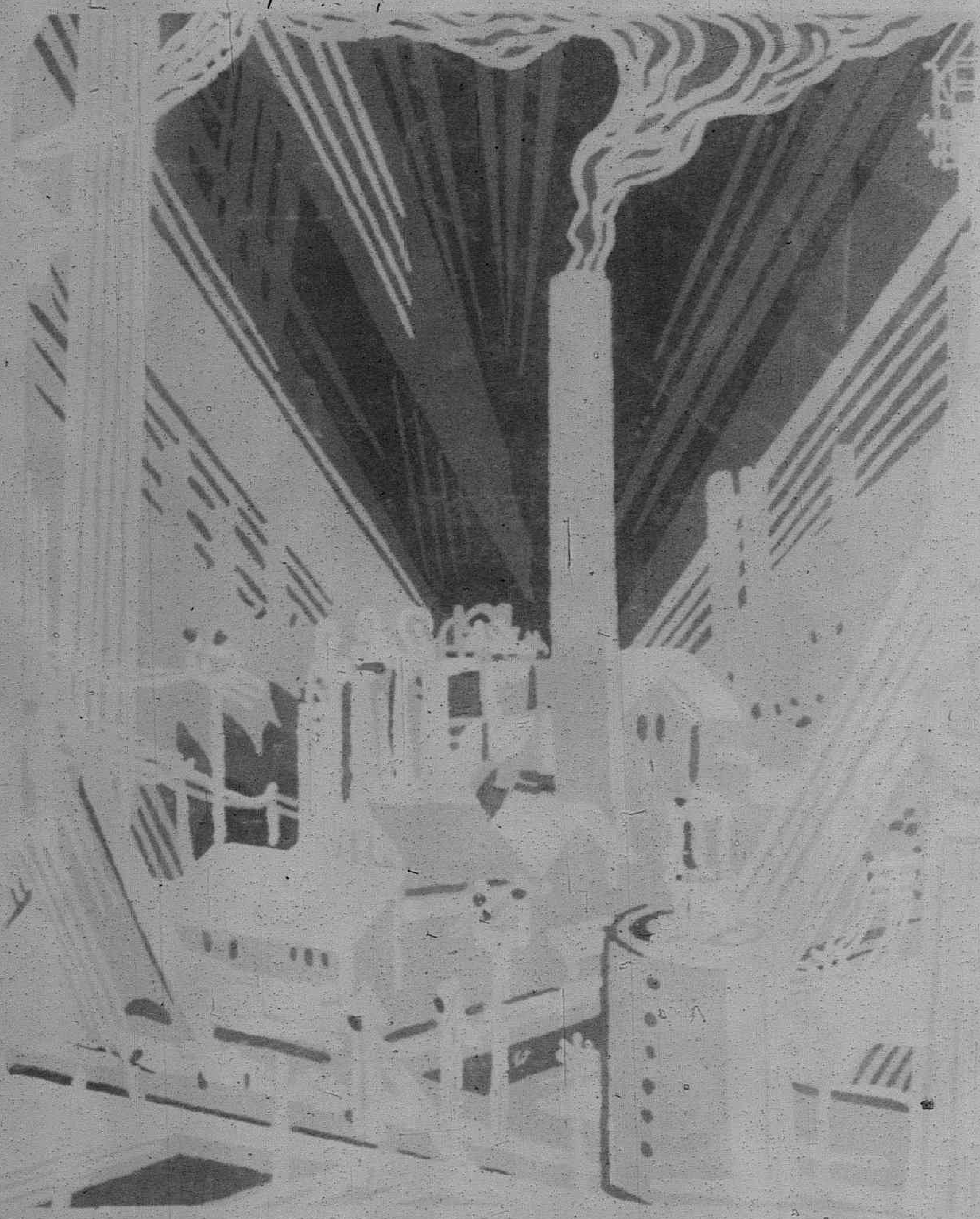
FAR EASTERN REVIEW



上海仁記路拾六號

遠東時報

ENGINEERING

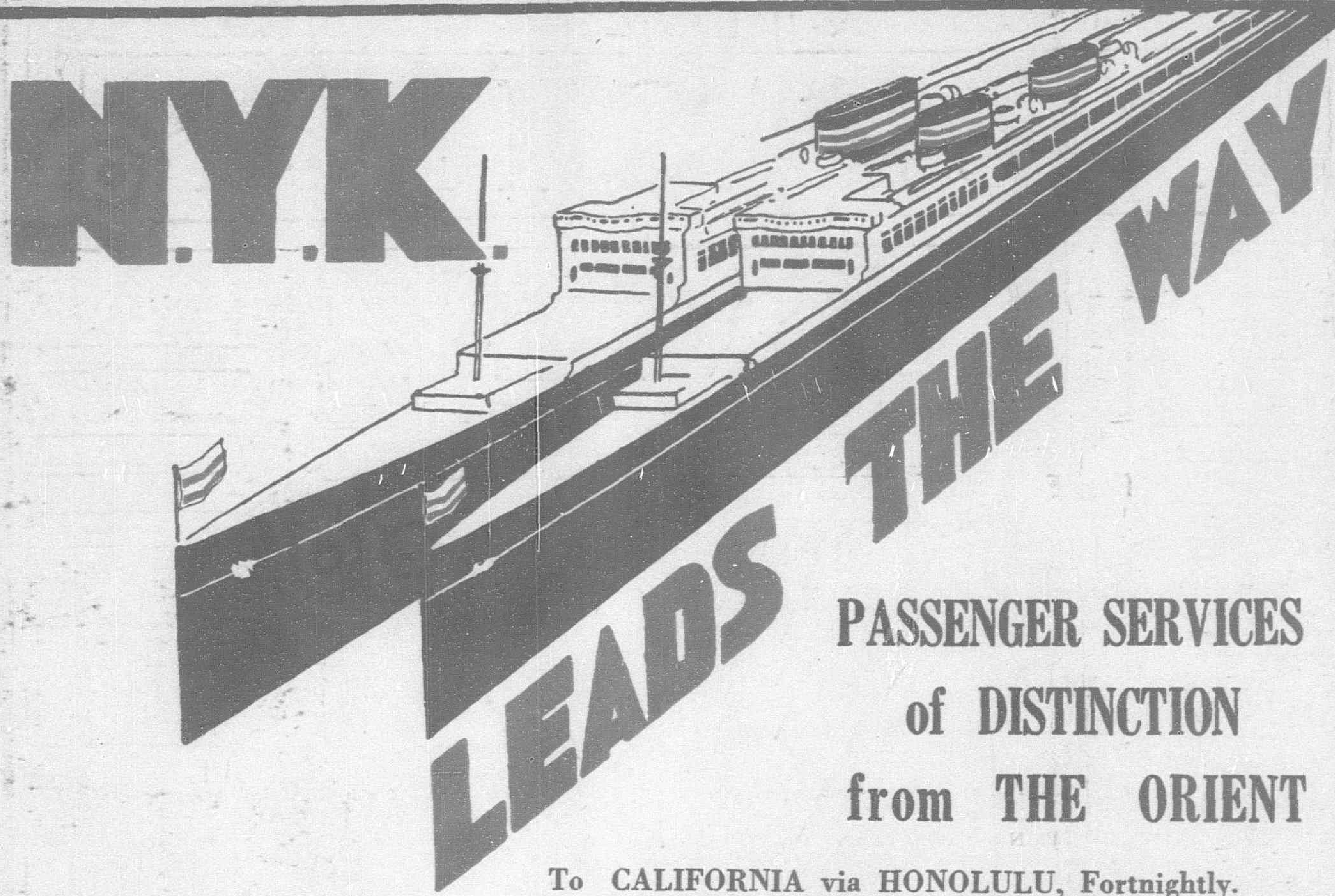
FINANCE COMMERCE

ASIATIC MARINE REVIEW

Vol. XXVI

SEPTEMBER, 1930

No. 9



PASSENGER SERVICES of DISTINCTION from THE ORIENT

To CALIFORNIA via HONOLULU, Fortnightly.
Three New Giant Motor-ships and Two Popular Passenger Steamers.

To SEATTLE and VICTORIA, Fortnightly.
Three New Splendid Cabin Motor-ships and also Medium-sized Cabin Steamers, the *Yokohama Maru* and the *Shidzuoka Maru.*

To PERU and CHILE via CALIFORNIA and MEXICO.
New Elite Passenger Motor-ship and Four Excellent Steamers, Monthly Sailings.

To BRAZIL and ARGENTINE via SOUTH AFRICAN PORTS.
Six Comfortable, Steady Steamers, Monthly Sailings.

To MARSEILLES and LONDON via SUEZ, Fortnightly.
Two New Passenger Motor-ships and Eight Modern Passenger Steamers.

To AUSTRALIA via PHILIPPINES and CELEBES, Monthly. Service Vastly Improved by Commission of Three Faster Vessels.

To BOMBAY via SINGAPORE, Monthly.
Three Medium-sized, Well-equipped Steamers.

CHINA-JAPAN RAPID EXPRESS SERVICE, Every 4 Days.
S.S. *Nagasaki Maru* and S.S. *Shanghai Maru.*

Full Particulars Obtainable at the Company's Offices and Agencies Located at all Important Cities and Ports Throughout the World.

N.Y.K., General Passenger Agents for Cunard Line

N. Y. K. LINE

Offices in China:

Shanghai, 31 The Bund
Hongkong, 8 Connaught Road

and also at:

Hankow, Canton, Dairen,
Tsingtao, Tientsin

The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XXVI SHANGHAI, SEPTEMBER, 1930 No. 9

That Matter of Gunboats and Other Pertinent Things

"*The presence of foreign war-ships in China actually imperils foreigners instead of diminishing their danger.*" So says Dr. Thomas F. Millard. Maybeso. Still, it is well to remember that the presence of these American gunboats in Nanking three years ago, prevented a wholesale massacre of foreigners and outrage upon their womenfolk while the larger war-ships of the American and Foreign fleets anchored in the Whangpoo, together with the emergency land forces hurried to the scene by the British Government, saved Shanghai from a similar and worse calamity. It is also gratifying to recall that the President of the United States publicly commended and promoted the naval officer in command of these little gunboats at Nanking, as well as the American Consul at that port for having "*lived up to the highest traditions of the service.*" The presence of foreign war-ships on the Yangtze, at Tsingtao, at Canton, and various other accessible places in China, have on innumerable occasions during the last decade saved the foreign community and their property from the depredations of bandits and uncontrolled soldiery. Of course, these little gunboats cannot very well convert themselves into tanks and cruise around the countryside on caterpillar wheels, or they might have prevented the outrage on the "Blue Express." It is interesting to recall that one of the journalists taken prisoner and held for ransom by the Shantung bandits on that occasion, was the first to yell vociferously for protection. After his release he was one of a select sub-committee who drew up and telegraphed a secret memorial to the State Department through the American Chamber of Commerce appealing for immediate armed intervention in the affairs of China. When his own person was endangered there was not enough of those little old gun-boats of the U.S.A. to guard his precious life, but later, when the lives and properties of his fellow countrymen and the honor of their womenfolk were imperilled, he headed the movement for the withdrawal of all American war-ships and troops and advocated immediate surrender to the demands of the Nationalist armies, at that time directed by the agents of Moscow!

Every community has the right to protect itself and it would be a fitting retribution if a certain type of agitators were compelled to swallow a dose of their own medicine. If these gentlemen were requested to remove their presence from Shanghai and other guarded treaty ports and forced to live in some of the interior cities or towns far distant from the coast or navigable rivers, they would soon learn to value the protection of these much abused gunboats and appreciate better the viewpoint of those "die-hard imperialists," whose motives and honesty they now ridicule and attack. To be consistent they should gladly set an example and place themselves under the protection of the Chinese authorities in some inland city. A few weeks in Changsha, Sian, Lanchow, Hengchow, Nanning, Kweilin, or a hundred other provincial centers, would be good for their souls. Its a poor rule that fails to work both ways. There is no reason why the authorities of the International Settlement should not take measures to protect the city against agitators who would imperil the safety of its inhabitants by depriving them of the only protection now available.

Let it be recalled that in 1924 when it was announced by telegraph from Hongkong that Dr. Sun Yat-sen had fled from Canton and would seek refuge in Shanghai, an American journalist in his dual capacity as editor of a daily newspaper and a weekly review, strongly advocated that Dr. Sun be refused permission to land in the Settlement. *He was a dangerous character, an agitator who imperilled the peace and security of Shanghai.* Basely betrayed, defeated, stealing out of Canton on a British vessel to escape capture and death at the hands of his enemies, sick, despondent and nearing his end, the Greatest Patriot that China has produced,. the Teacher and Leader whose Will is now the accepted constitution of the Nationalist Government, was informed that he could not land in Shanghai; his presence here was a menace to the peace of the community. It was the last straw. The American editor, who advocated these measures against the Chungshan and helped drive him northwards on a Japanese steamer to his death, is now the Journalist-Hero of Young China, the Defender of the Cause whose Leader he was instrumental in sending to an untimely grave! Young China and Nanking should be proud of their Champion. Is it any wonder that the Nationalist Government is hoodooed by carrying a Jinx which disturbs the *Feng Shui* of Purple Mountain.

The Nationalist Government has the best intentions in the world. It is undoubtedly doing all in its power under most trying conditions, to protect foreigners but it would be unwise and suicidal to surrender the only protection Chinese and foreigners alike now enjoy, until such time as Nanking can consolidate its power, maintain law and order and provide protection in all parts of China. In such restricted areas of China now more or less under the rule of Nanking, this protection fortunately can be readily extended. But it certainly does not hold true outside of Shanghai and a few coastal and river cities within the reach of foreign gunboats.

Why the Nationalist Government persists in paying out good money to disseminate prejudicial propaganda is beyond comprehension. Dr. Millard speaks officially for Nanking. His utterances at Williamstown are on a par with the communication from Dr. C. C. Wu to the American State Department to the effect that the Nationalist Government assumes full responsibility for the protection of American lives and properties, at the very time when it could not guarantee its own existence or protect its unfortunate people from being butchered by the Red hordes in Hunan.

The Nationalist Government should be fully informed of the oft-declared policy of the American Government towards the protection of the lives and properties of its nationals abroad, a policy written into the Platform of both the Republican and Democratic Parties at the last election and emphasized in clarion notes by President Coolidge in a Fourth of July Gettysburg address as a fundamental obligation of government. Yet Nanking seems determined to ignore these official declarations of fixed American policy, and go behind the Administration by appealing to public opinion through bungling advisers.

Suppose the picture was reversed and foreign propagandists swarmed over China to influence public opinion to declare itself on the subject of extraterritoriality, gunboats, famine relief and a hundred other subjects. Foreign governments and foreign newspaper correspondents are accepting the voice of Nanking as the voice of China, but if there was a real open forum in this country, a free interchange of thought, liberty of the press and tolerance of opposite political views, we imagine that many of Nanking's pet foreign policies would receive little support from a people whose uppermost thought is where they will get the next bowl of rice. Any open attempt to combat or oppose the policies or programs of Nanking by a direct appeal through propaganda or speech to the Chinese people would result in the immediate arrest and deportation of these foreign imperialists. Yet the Chinese do not hesitate to dispatch peremptory telegraphic demands to the President of the United States or to carry on propaganda in America to influence public opinion to bring pressure upon its Government to conform to its viewpoint. Whoever heard of a group or body of foreigners in China going over the heads of their official diplomatic representatives and making demands upon the President or Government of China? In America however, we are very liberal and permit any foreign propagandist or agitator to carry on his campaign to change the established policy of our Government.

All this means added work for the overtaxed State Department which is reluctantly forced to detail its Assistant Secretary of State and Chief of its Far Eastern Division to attend these international Chatauquas and keep the record straight. Dr. Millard as the official spokesman of the Chinese Government conveyed to the Williamstown Institute of Politics, the message of Nanking and Mr. William Castle, Assistant Secretary of State, answered by reiterating the fixed policy of the American Government in the following words:

> **"A nation which cannot rule itself, must always be a menace to the rest of the world. With Japan, England, and the rest, we can only look sadly at the chaos in China. At the same time we must always be ready to lend a helping hand. Though we must stand aside now, it does not mean that we shall allow our nationals in China to be killed or our property to be destroyed. No nation has ever forwarded the cause of peace by weakness when a moral principle is involved. No nation can help build a united and prosperous China by permitting the Chinese to destroy the principles upon which international society stands. By protecting our own nationals, we actually help to forward the aims that we share with Japan and England—I speak of them because they are most deeply concerned—the aim to help China stands on her won feet, free, prosperous, unified and happy."**

Dr. Millard and his hero-worshippers in China are welcome to all the comfort they can squeeze out of this straightforward statement of American policy towards "that matter of gunboats in China."

Gunboats and extraterritoriality go together. The withdrawal of American gunboats and the abandonment of American citizens to the jurisdiction and protection of the Chinese authorities is a corollary to the end of extraterritoriality. Dr. Thomas F. Millard in another part of his address at Williamstown told his audience that "*the end of extraterritoriality has now become a virtual necessity and that the United States must revise its treaties with China or jeopardize the safety of its citizens.*" A deplorable statement and worse propaganda: an attempt to intimidate American opinion and force its Government to accept the Chinese viewpoint. It is a serious statement. The end of extraterritoriality will come just as soon as a government capable of preserving internal peace, maintaining law and order and extending protection to foreigners residing in the country, is functioning. It will be a happy day for all foreigners when these conditions obtain and China's full sovereignty is recognized; but that day cannot be hastened by threats or coercion.

For an official on the pay-roll of the Nationalist Government to declare in an open forum that American lives will be imperilled unless extraterritoriality is immediately ended, is the most insulting message that has ever been conveyed directly or indirectly to the American Government by an official of another state. It is the most disquieting and alarming interpretation of Nanking's policy and intentions that has so far been revealed to foreigners resident in China. We are as seriously informed by Mr. Geo. E. Sokolsky (a much better authority on Nationalist policy than Dr. Millard) that "*China's wars must continue until the feudal groups are destroyed, a process that may require many years.*" In other words, if, and when, Nanking defeats and disarms Feng and Yen, cleans up the bandits and Reds in South and Central China and brings Yunnan and Szechuan under its sway, it will carry the war into Manchuria; a long drawn out affair and with the possibility that Nanking may not be so successful with the well drilled and equipped Manchurian armies. In this war to the death with Manchuria; a war that for many reasons will be fought South of the Great Wall; Nanking will again be forced to drain Central and South China of all available troops and turn the countryside over to the Bandits, Reds or whatever you want to call a people driven to excesses by the anarchy of despair.

Mr. Sokolsky knows what he is talking about. The picture he paints cannot lightly be ignored. It tells us that the need for foreign gunboats on the rivers of China, the presence of land forces at Shanghai for the protection of foreign lives and properties is greater to-day than ever before. Yet Dr. Millard, the official Adviser to the Nationalist Government threatens us with dire consequences unless these safeguards are withdrawn and the treaties which legalize them, are revised forthwith.

Dr. Millard is an American citizen and could not be so lost to all sense of decency as to make a statement of his own volition, that when broadcasted over China (as it has been), will further incite the anti-foreign element to outrages upon the persons of foreigners. We must, in all fairness, assume that in making this ominous threat, he conveyed a message to the American people and their Government communicated to him by his employers in Nanking; an indirect warning that no official of the Nationalist Government would dare to issue or confirm over his own name.

The lives and properties of Americans in China, the honor of their womenfold are in danger. Either Dr. Millard's words at Williamstown are a faithful expression of Nanking's intentions, or his own personal views. Which is it? It is the duty of every American organization in China to demand through the diplomatic channels of their Government whether or not Dr. Millard's ominous forecast was authorized by the Nationalist government, or not. The American Minister, should request an immediate explanation from Nanking as to Dr. Millard's authority for making such a statement. Dr. C. T. Wang must deny it and throw overboard this bird of ill-omen, for even if what he said is only half true, it tells us in words too plain to be misunderstood, that Nanking is powerless to hold in check the lawless element of China, the strongest possible argument for the retention of the American gunboats and armed forces for the protection of their nationals.

If we are mistaken and Dr. Millard reflects even a small portion of Chinese official sentiment, then Americans in China have cause to be thankful that they have a Government that intends to keep the Fleet in Chinese waters, the Patrol on the Yangtze and the Marines in Shanghai, until Nanking can complete its task of unifying China, "*a process that may take many years.*" Dr. Millard has not advanced China's cause by appearing in Williamstown.

This makes the third time within three years that over-zealous champions of Chinese Nationalism have swung a club over an American audience in order to intimidate Washington into accepting the Chinese viewpoint on extrality. Three years ago at Los Angeles, another fulminating American adviser to the Nationalist Government, went so far as to thunder at a gathering of women, that "any American who remained in China, deserved to be shot," while another well known Peking educator told an audience in Philadelphia that unless the American Government complied with the wishes of the Nationalists and surrendered extrality forthwith, *Americans in China would be massacred.* Fortunately, this gentleman had the sense to make amends later on by stating privately that he had been misquoted, but the Philadelphia newspapers stood pat on what they had published.

Nanking does not have to pay for such damphool advice and pestilential propaganda to advance its cause amongst its friends in the United States. It is just this sort of injudicious publicity that has done so much these past three years to lose for China the sympathy and support of the American press. China has real friends, even amongst those who criticize her; friends who do not have to be paid to applaud and commend when a substantial achievement or step forward is made. But China's real friends are first and foremost good citizens of their own countries, and they speak the same language that Assistant Secretary of State Castle did at Williamstown. And unless we are very much mistaken, Nanking will read this same language in the draft reply of the American Government suggesting a method for the gradual relinquishment of extraterritorial privileges. And if the American proposals appear a little too hard, the Chinese can thank such official spokesmen, who like Dr. Millard have made imperative the continuance of precautionary protective measures until Nanking's authority is extended to all parts of China, even into Manchuria—G.B.R.

"The Menace from the Direction of Urga"

Looking Ahead Five Years

By GEO BRONSON REA

"The Altai Region is the richest mineral region in the world." Whoever controls the mineral wealth of this region will be the Master of Asia. Turn to the Consortium Supplement of *The Far Eastern Review* of April 1921 and read the original article on "The Menace From the Direction of Urga" for a fuller understanding of what the future holds out for China, for Japan and for India as the result of a hysterical anti-Japanese propaganda which broke down the one defence of these territories against the ages-old thurst of the land-hungry millions of Muscovy with their eyes fixed on the blue waters of the Indian and Pacific Oceans. At that time, the Germans with the doors of all allied countries closed to them, were seeking an outlet in congenial territory and their Emigration Board fixed upon Siberia as the Land of Promise. In an interview with Mr. Kenneth L. Roberts of the *Saturday Evening Post* (June 19, 1920), Dr. Jung, head of the German Emigration Board discussing the future of German emigration, frankly stated that Russia and Siberia offered the only outlet. "Russia to-day," he said, "is impossible because of the disturbed situation, but when it clears, it will be the logical goal for all German emigration. We will encourage this overland movement rather than allow it to find its outlet overseas."

"One of the greatest financial experts of Germany stuck his thumb across a map and screwed it back and forth on the Altai Mountains which divide the table-lands of Mongolia from Siberia and amongst whose mighty slopes the three great Siberian Rivers, Obi, Irtish and Yenesei have their beginnings.

"In these mountains, he said, there lies an untold wealth of iron and copper and silver. Our explorers have reported that it is so. The Altai region is the richest mineral region in the world. Germans will go to that region in great numbers."

The Germans are great hands at figuring out exactly what will happen under certain conditions and at taking steps to provide for the happening. Nothing is left to chance. Walter Rathenau, head of the German General Electric Company pointed out in 1920 that with the weakening of Europe as a result of the war, the future will belong to America, Russia and Japan. These new economic areas will make such strides that it will be difficult for Europe to pull up again." The prophecy is now working out.

For the past ten years, the world has drifted away from the pre-war conditions. Old empires are disintegrating. The great nations engrossed with their own vital problems have had no time to devote to pressing Asiatic affairs. When we now awake to a realization of what has been going on in this part of the world, it becomes apparent that while other nations have been bickering over tariffs, navies, peace, arbitration pacts and whatnot, Russia has forged steadily ahead with her own plans until she is now rapidly approaching the goal of her dreams, arriving at that stage of her development where China will once more be brought face to face with "the menace from the direction of Urga." The quack diplomatic surgery of the Powers trying to insert a backbone in a jelly-fish, is responsible for a situation where Japan is now called upon to stand the brunt of any effective opposition to the Soviet program. China has delayed too long in putting her house in order. She cannot perform the miracle in the short time left, before a rejuvenated Russia is prepared to resume its traditional forward movement in Asia. Who will come to the assistance of China?

WHEN Dr. Sun Yat-sen, planning for the future greatness of his country, drafted a scheme of 100,000 miles of new railways to be built in ten years, at a cost of five billion gold dollars, the world laughed and called him a dreamer.

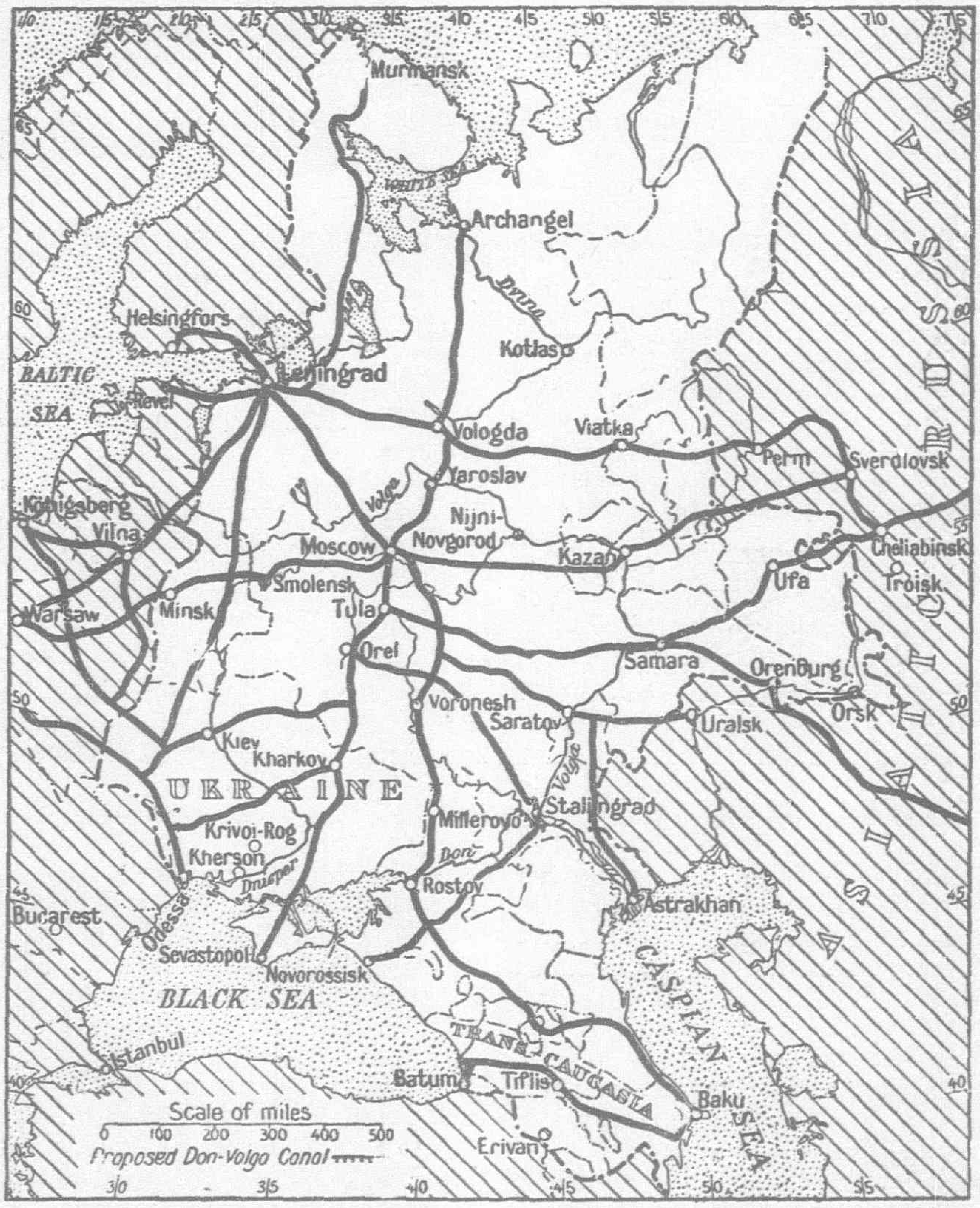
Now comes Moscow with a Five Year Plan, involving the expenditure of 34 billion dollars supplemented by a Fifteen Year Transportation Scheme which surpasses even the extravagant dreams of Dr. Sun. The Soviet intends to spend 18 billion roubles (about 9 billion gold dollars) in railway development and improvements during the next fifteen years, but we hear no caustic comment about the impracticability of the scheme or the sanity of its sponsors. A communistic state controlling the disposition and sale of the crops and industrial output of 150 million people can carry out construction projects financially impossible for any other government.

"The socialized economy of the country enables it to pool all its resources under a unified financial plan. This plan takes into consideration all existing sources of funds, whether they come from the federal budget, the local budgets, the banks, government industrial and trading enterprises, co-operative societies, social insurance funds, State insurance funds, and the like. In the year 1929-30, it is estimated that there will be available from all sources 18,200,000,000 roubles. Of this sum, 36.6 per cent. is to come from the profits of enterprises, 31.2 per cent. from taxes, 14.2 per cent. from internal loans, 9 per cent. from insurance funds and so forth. Over 60 per cent. of the whole fund will be spent for the needs of the national economy, 22.8 per cent. and for social and cultural needs."

The nation which controls and develops the Altai mineral regions will become the Master of Asia. A huge steel plant located on the northern slopes of these mountains will grow into a munitions base in the inaccessible heart of the continent, safe from the attack of any enemy power, even from the air. A steel plant in the Altais will provide Russia with the one essential she has hitherto lacked in pushing forward her policies in Asia. Russia lost the war with Japan because she could not supply her armies in the field over four thousand miles of single track railway. Ever since 1906, she has been working to establish a new system of military preparedness. Hardly had the ink dried on the Portsmouth Treaty than she launched a program of construction to evade its provisions. The Circum-Baikal line was completed; the Amur line rushed through and the Trans-Siberian double-tracked and straightened in places, preliminary to its complete reconstruction. Huge schemes of industrialization and colonization in Trans-Baikalia and the Amursk were entered into in order that when again ready to try conclusions with Japan, the Russian armies could be supplied with food and munitions from Central and Eastern Siberia. Russia planned to reopen the war with Japan in 1912 and had the more important events in Europe not diverted her attention, the struggle for the Mastery of Eastern Asia would have been resumed in the years immediately preceding the greater World Conflict.

Russian policy never changes. It may receive set-backs and be slowed up, but the relentless advance of a land-hungry prolific people cannot be deflected from the path of least resistance. As the Far West was conquered, settled and reclaimed from savagery by the grandfathers of the present American generation, the same urge and lure of new lands will bring the whole of Central and Eastern Asia under the sway of the Slav seeking his outlet towards the East. The next ten years will see the eastward rolling Soviet tide beating fiercely against the flimsy dykes protecting the homelands of the Mongolian races. Already Outer Mongolia is a part of the Soviet system; Chinese Turkestan is automatically gravitating to the Soviet economic sphere; the Barga region is slipping from the control of the Heilungkiang satrap; the Slav pressure is being felt all along the vast extent of China's far-flung border lands. The great racial conflict which ten years ago seemed inevitable in the Pacific has been forced back into Central Asia, where it belongs. For that much, America can be thankful.

The Czar built the Manchurian Railways to facilitate his program of conquest. Russia never even tried to make these lines pay. Not until 1922, did the Chinese Eastern Railway under Chinese direction, show a profit. For twenty-five years, the huge annual deficit of the line was met by the Russian Imperial Treasury. Yet in those two decades of official ineptitude and indifference, the population of Manchuria increased from three to thirty millions. The barren wastes of the Three Eastern Provinces, previously closed to Chinese colonization, were brought under cultivation and developed into the most prosperous region of Eastern Asia. Japanese initiative, capital and enterprise made possible the immense soya bean industry, opened mines, erected nanufacturing plants and developed the South Manchuria Railway into the most profitable transportation enterprise in Asia. Their success aroused the cupidity and antagonism of Chinese officialdom who determind that this wealth should remain under their control. In this program they were aided by conditions in China proper, where the intolerable burdens heaped upon the people, started one of the most remarkable migrations in history. Fleeing from the tyranny, wars, persecutions and taxation of their taskmasters in the provinces south of the Wall, Chinese farmers swarmed into the vacant spaces of Manchuria creating new sources of wealth and revenues which filled the coffers of the Manchurian War Lords and enabled them to defy the authority of any government in China Proper. Continued immigration into this region and the rapid expansion of its natural resources has evolved in few short years a new independent Chinese state having nothing in common with any government functioning in Peking or Nanking. The "neutrality" of the Young Marshal in the present civil war, constitutes a declaration of independence just as pronounced and secessionary in its political significance as the rebellion of the Northern Coalition against the recognized government at Nanking.



(From Foreign Affairs)

RAILROADS IN EUROPEAN RUSSIA

The Soviet Fifteen Year Transportation Program involving the expenditure of Nine Billion Dollars is largely concerned with linking up the existing railways radiating from Moscow, building feeders, intensifying the services and acquiring new rolling stock. New lines are intended to link the trans-Ural regions with the port of Rostov on the Black Sea.

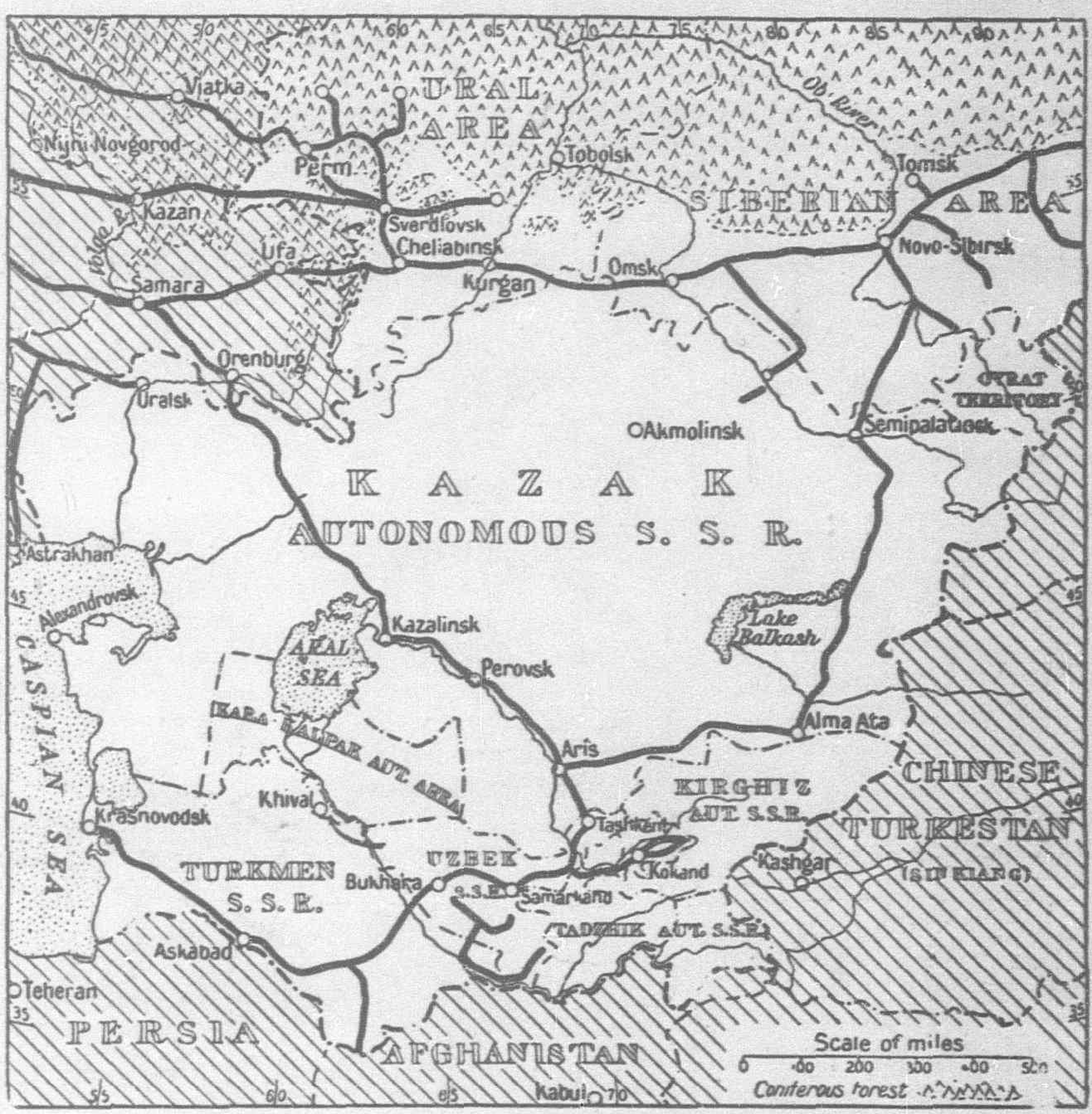
Notwithstanding the plausible alibi advanced by the Young Marshal that he needs his armies in Manchuria to watch Russia and Japan at this crucial period in China's history, his inaction when Nanking is battling for its life, is unpromising for the future solidarity of the nation. Such a situation in any coalition of states in any other part of the world would make impossible further recognition by the Powers of any faction as representative of the whole.

The admission of Manchuria's special position revealed in Nanking's "negotiations" with the Young Marshal for his support to crush the Yen-Feng-Moscow faction is perhaps the most disquieting feature of the present conflict. When the recognized government at Nanking has to descend to cajolery, bribery and promises of additional territory and to actually hand over the administration of Tsingtao, to induce the Manchurian War-Lords to discharge their duty, how can it expect to inspire foreigners with confidence in its ability to unify the nation and protect their interests? It is true, perhaps, that the Young Marshal displays remarkable political wisdom in refusing to move his armies south of the Great Wall and there-by invite an invasion of his own bailiwick that would carry the war into the South Manchuria Railway Zone and justify Japan in taking drastic action in defense of her vested interests in that region. The principle which preserves Manchuria from being invaded from the south must work both ways to be equitable. If the certain intervention of Japan constitutes a guarantee that no southern army will be permitted to carry the war into Manchuria, it is only fair that Mukden remains neutral in any conflict south of the Wall that would justify reprisals. If we accept these cold, hard facts of an inescapable situation, it proclaims in no uncertain terms that Manchuria is inviolate, completely independent of any government functioning in China Proper, Nanking cannot establish its authority in Manchuria by force of arms without inviting a clash with Japan. If we accept this interpretation of Manchuria's neutrality, then the fiction of a unified China disappears, and in its place, we see a semi-independent state, under the protection of Japan, a situation which will exert a most important influence on the future of Eastern Asia.

The neutrality of the powerful Manchuria War-Lords will enable them to emerge from the present civil war as the dominant influence in China. Nanking may receive lip-service from Mukden as the Central Government and be recognized as such by the Powers, but the absurdity will end at the Great Wall. Manchuria is, and will remain an independent, autonomous state. Nanking will be exhausted, burdened with debts, and confronted with the task of cleaning up the bandits in all parts of the country. Manchuria will become stronger and wealthier.

Last year, when Nanking was struggling against a combination of internal enemies, the Tuchun of Kirin increased its burdens by provoking a show-down with Moscow over the Chinese Eastern Railway. Last year, Moscow was not prepared for a war in the Far East. Five years from now she will be forcing the issue. This year, Nanking is battling for its existence while the Manchurian War-Lords hold the ringside, providing both factions with supplies and war materials from their two hundred million dollar Mukden arsenal, raking in the cash with both hands that Nanking and Peking are extracting from the overtaxed people. Next year, or the year after, the shoe will be on the other foot with the Manchurian War-Lords facing a determined nation no longer dependent upon European Russia for its military supplies. Nanking, if it adheres to traditional Chinese political strategy, will leave Mukden to its fate. Japan, in self defense, will be compelled to protect its vital interests. *Russian policy never changes.* When Moscow's preparations are completed, when Siberia has been revitalized by new railways, iron and steel mills and other basic industrial plants, the course of Far Eastern history will take another abrupt turn.

The Soviet Five Year Plan of speeding up agriculture and industry has been reinforced by a fifteen year transportation program, providing for the expenditure of nine billion gold dollars on railways, 3.8 billions on sea and river transport and 2.6 billions on highways. In the main, European or Asiatic Russia offers no great engineering obstacles to railway construction. The average cost per track mile of the recently completed Turk-Sib railway was about $55,000 (gold), a fair estimate for further construction. If all of the nine billion dollars were expended in construction and equipping new lines, it would pay for approximately 10,000 miles of new railways per year or a total of 150,000 miles in 15 years The main object. of the program, however, is to link up the existing system of trunk lines radiating in all directions from Moscow, building feeders, intensifying existing services and acquiring new locomotives and rolling stock. Many new lines are also projected for Siberia and Central Asia.



(Prepared by the American Geographical Society of New York and reproduced from "Foreign Affairs")

Railroads in Soviet Central Asia, Showing their relation to China's Far Western Borderlands and the approach to Afghanistan.

The most significant and interesting phase of the Soviet program, are the plans for the development of Siberia and Central Asia. There, on the steppes of Turkestan, the borderlands of Hsinkiang and Mongolia, the slopes and valleys of the Altais, the taigas of Siberia, the vast rolling wheat lands of Trans-Baikalia, the gold fields of the Amur, the forests of the Maritime Provinces and the fishing waters of the Japan Sea, will be repeated the drama of the American Far West. The surplus population of European Russia will be transported to these waste lands, where under any kind of equitable government, even communistic, they will prosper. A new nation will arise to assert its dominance in Asiatic affairs.

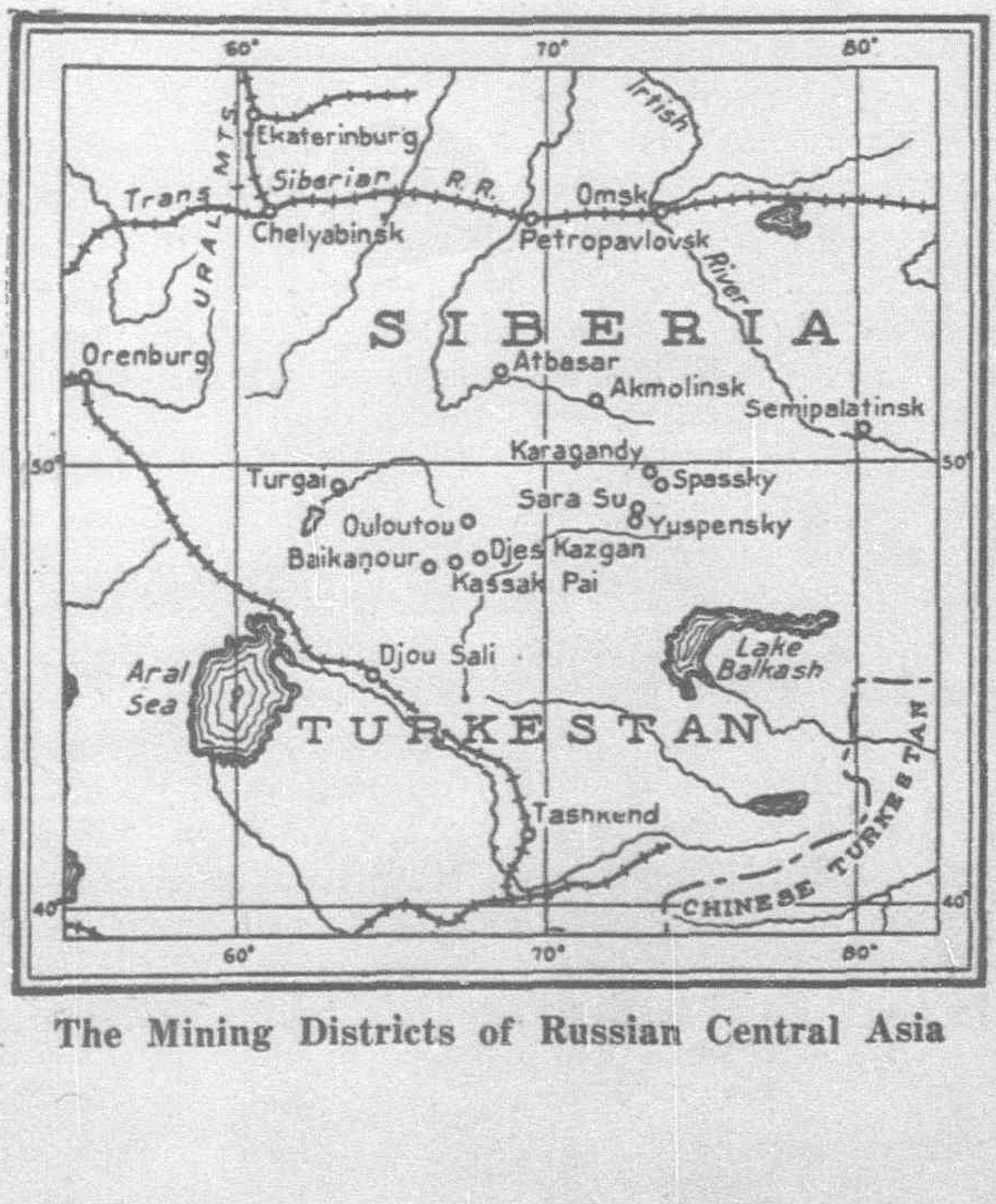
The plans for the industrialization of Asiatic Russia call for an immediate expenditure of $380,000,000 gold. Ports are to be expanded, factories erected, mines, forests and fisheries developed and 800,000 workers transported into the regions to speed its growth. The following expenditures will give some idea of what the Soviet contemplates in Far Eastern Russia within the next few years :—

River and Harbor Improvements	$20,000,000
Agriculture—Machinery ..	30,000,000
Industries, including Steel Mills	150,000,000
Fisheries	21,000,000
Forestry	33,000,000
Mining and Oil Wells ..	40,000,000
Textile Mills	40,000,000
Food Factories	9,000,000
Shipbuilding	24,000,000
Electricity	13,000,000

The above expenditures fail to provide for railway extensions and improvements. These are evidently covered by the nine billion dollar Fifteen Years Transportation Program. Although there is no intimation as to where the new Central Asian and Siberian railways are to be constructed, one of the pressing problems is the complete modernization of the Trans-Siberian line. Mr. Ralph Budd, president of the Great Northern Railway has been engaged by the Soviet Government to advise them on how this can best be carried out. Mr. Budd is now in Russia making a tour of inspection of the Trans-Siberian line, preliminary to other studies looking towards the Americanization of all the Soviet State Railways. Although no great emphasis is being publicly displayed on the rehabilitation of the Trans-Siberian, it is obvious that its re-equipment in order to handle the enormous strain on its carrying capacity, is the first step in any serious development program for Central Asia or Siberia. The outstanding feature of this huge expansion scheme is revealed in the contract recently signed between the Soviet representatives and the Freyn Engineering Company of Chicago for the erection of a million ton steel plant at Kuznetsk, in the Altai region about 220 miles south of Tomsk.

This is not a dream or a paper program. The contract providing for American assistance in the design, construction and operation of the plant, which will cost (including a workers' town and a regional power plant) about $150,000,000 gold, was signed in Chicago on June 4 last by Mr. F. T. Kolgushkin, Chief of the Kuznetsk Basin Steel Mill Construction Bureau, and Mr. H. J. Freyn, President of the Freyn Engineering Company.* The Kuznetsk steel mill is being built to satisfy the rapidly growing demand in Siberia for steel products, but its military significance cannot be ignored any more than we can close our eyes to the real purpose of other great steel plants in the territories of the Little Entente, whose commercial operation is made possible only by heavy subsidies from the governments interested in converting them at a moment's notice, into their pre-war status of munitions factories.

The Kuznetsk contract is the second of its kind concluded in the last few months between the Soviet and American engineering firms. The first, with Arthur G. Mc Kee & Company of Cleveland, Ohio, called for technical assistance in the erection of the Magnitogorsk Steel mill in the Urals with a yearly output of 2,500,000 tons.



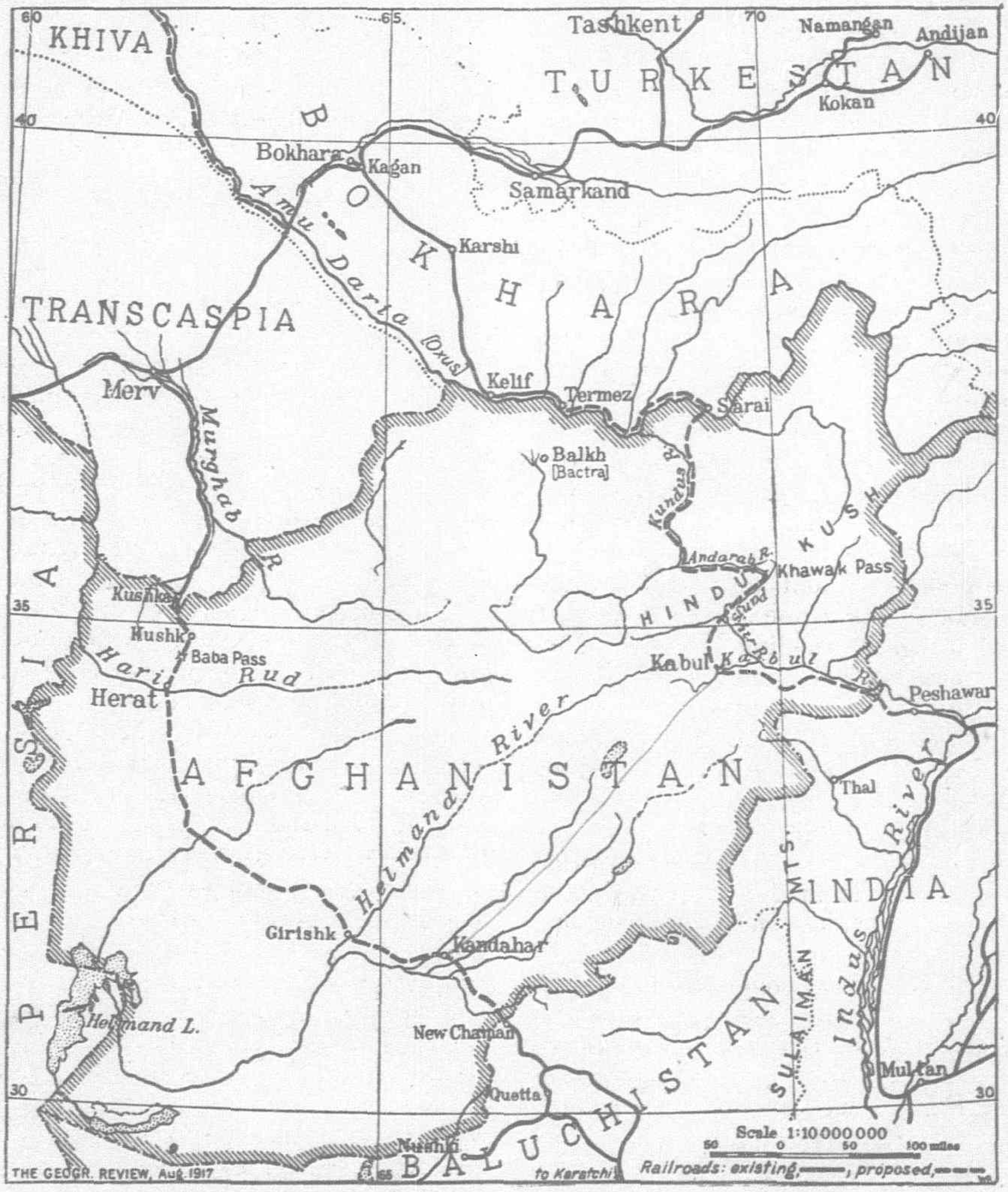
The Mining Districts of Russian Central Asia

---

*See article on page 488.

According to the latest estimates, the Soviet demand for iron and steel products will be in excess of 15,000,000 tons by 1933, about three times the present output.

In addition to these important American contracts, the Soviet non-ferrous metal industry has engaged seventy-eight American engineers, geologists, superintendents, foremen and instructors since January of this year. In this group are included mining and metallurgical, mechanical and electrical engineers, mine and smelter foremen and superintendents and instructors in die-casting dredge operation, diamond drilling etc. These men are scattered throughout the principal mineral regions of Russia and Siberia; eight engineers, a dredge superintendent and an instructor in dredge operation being located at Irkutsk, the Headquarters of the Soviet Gold Industry. Altogether, there are nearly a thousand American engineers working to-day in Soviet Russia under contract with the government. Hundreds of Russian engineers are in the United States learning our ways of mass production. At the same time, it must not be overlooked that the Soviet is also drawing heavily on Germany for technical advice and assistance, especially in the steel industry. The Steel and Iron Industry Trust "STALJ" recently engaged two hundred German engineers and one thousand skilled German workers for the various steel mills under its control in the Soviet Union. American skill is being drawn upon for the erection of the mills, but their actual operation will be under German direction. Huge orders for materials of all kinds are being placed with American engineering manufacturers. The Soviet is importing millions of dollars worth of American machinery for new railways, textile, paper and other industrial mills, farming machinery, packing, canning, automobile and tractor plants, steel and iron mills, mines, chemical enterprises, shipbuilding and electrical power plants. On all sides are signs of pushing activity and although reports from Russia stress the poverty and discontent of the peasants, the flow of orders and the engagement of American experts for immense construction projects would seem to indicate that the necessary billions for development are being found without difficulty. It is impossible to outline here the details of the Soviet Five Year Plan and its supplementary Fifteen Year Transportation Program. Something may happen to curtail or modify these plans, but for the present there is sufficient evidence to justify the expectation that they will be carried out according to schedule. It would be folly to close our eyes to the evidences of a feverish preparation to place the country on a new economic basis.



(From the Geographic Review)

Since this map was published in 1921, the Russian approach to India has been facilitated by the recent contract between the King of Afghanistan and a German company for the construction of a system of State Railways which will link Kabul with the Indian Frontier, Kabul with Kandahar and northwards to Herat and Kushk, the terminus of the Russian Central Asian system.

What effect this wide-awake progressive program will have on the future of a slothful, feudalized and bankrupt China, is not difficult to forecast. The Soviet program in Central Asia alone will exert a powerful influence upon the political future of the medieval frontier provinces of Far Western China, whose only trade outlet and contact with the world is through Soviet territory. When the Soviet no longer depends upon her European industries to supply her military requirements in Central Asia and Eastern Siberia; when the 2,500,000 ton Magnitogorsk mill in the Urals and the 1,000,000 ton Kuznetsk mill in the Altais are operating in full blast, the Soviet will enter upon a vigorous program of economic and political expansion and a firmer policy in dealing with China. The picture of a petty Chinese War-Lord throwing down the gauntlet to Moscow in order to cover up his peculations and save himself from exposure by an honest auditing of the Chinese Eastern Railway accounts at a time when the Soviet was unprepared and reluctant to engage in hostilities, will never happen again.

Russian policy never changes. No government in Moscow, no matter how altruistic, pacific and friendly its intentions, can check the ceaseless pressure of a migratory force whose only outlet is towards the East. Moscow is hastily preparing to give further momentum to this impulse of an insatiable land-hungry people. The forward march of the Bear will be resumed where the Czarist régime left off. Five years from now, the Chinese War-Lords will wake up from their dreams of individual aggrandisement to find a rejuvenated, irresistable and aggressive neighbor that will brook no further obstructions to her program in Asia.

No single nation or league of nations can interfere in such a situation. The Open Door Doctrine, which has protected China's integrity for the past thirty years, has gone into the discard, superseded by the Four Power Agreement and the Kellogg Peace Pact. With the signing of new commercial treaties, China will stand on her own bottom, a sovereign state that must defend its outlying provinces when one by one they are compelled by sheer economic necessity to enter into the congery of Soviet republics or protected states. Supplied with rails from the Kuznetsk mill, a network of new lines and feeders will tap the fertile Ili and Kuldja regions and create a chain of prosperous cities, towns and farming communities dependent upon Soviet Russia for their necessities and as markets for their produce. New villages are already springing up all along the Turk-Sib railway; streams of settlers are swarming in and within a few years, the available lands up to the Mongolian border will be taken up and the adventurous seekers of wealth will flow over the boundary into the lands of the Mongols. Other feeders will branch off from the main Trans-Siberian line towards the northern confines of Mongolia tapping the rich resources of these regions and drawing them to the main artery of world traffic. There will be no difference in this program of economic penetration diverting the trade of China to outlets outside the jurisdiction of its government, and in the outworn spheres of interest policies which so successfully accomplished the same end through railway concessions. China, as the sovereign state, must either build lines within the confines of Mongolia and Hsinkiang connecting with her own transportation system or stand aside while the outer Mongolian and Hsinkiang authorities build their own links with the Soviet system and with Soviet money. With at least 25,000 miles of urgent railway construction to be carried out in China Proper, the Central Government will have no funds to spare for these far distant lines whose revenues will never enrich the national treasury. Russia's economic penetration into these regions will create other semi-independent states like Manchuria, having little in common with the suzerain government in Nanking or Peking. The Soviet has embarked upon an up-to-date program of conquest by railway and economic penetration that will bring greater acquisitions of territory, prestige and wealth than the more ruthless annexation methods of the Czarist régime.

The impact of a booming industrial neighbor upon the frontiers of a weakened, impoverished and disunited China, backed up by a realization of power never before possessed by Russia in her Asiatic adventures, will in due course precipitate a major issue that will decide the mastery of Asia. Great Britain, hitherto the dominant factor in Asiatic politics, is facing the climax of her long imperial career. Her problems are unparalleled in number and fatefulness, both in the political and economic sense. India is breaking away, demanding an independence that if ever conceded, would deliver the helpless Hindoo millions to a Brahminical tyranny whose conception of the fundamental rights of humanity are so abhorrent to Anglo-Saxon ideals that the entrance of such a state into the family or league of free peoples would be a betrayal of all that our civilization represents. Ten thousand times better a Communist or Sovietized India under the heel of Moscow than the creation of a Hindoo state perpetuating the most repugnant system of social relations recorded in the history of the world. The British Government has promised Dominion status to an India that demands nothing short of complete independence. If, and when, the strong hand of British authority is withdrawn, India will drift swiftly into a chaos and anarchy worse than China, and come under the complete domination of Moscow.

Britain may make a supreme effort to hold on to India, but the " Bear-That-Walks-Like-A-Man " has come forth from his hibernation of twenty years and is again growling his slow, cumbersome way across the Pamirs towards the honey pots he has dreamed of for centuries. The Bear may be stopped, but it will take the last ounce of strength from a nation which must face the ordeal in a country no longer loyal or amenable to conciliation, and whose leaders are playing the game of Moscow. The Soviet believes it has little to fear from a nation whose two million unemployed would preferably start a revolution from within rather than be drafted into another overseas campaign. If Britain lays down in Asia, it is only a question of time when Moscow will dominate the continent.

Still, it is not always wise to jump to hasty conclusions. There is a lot of fight left in the Old Lion. It may well be that in the project to build a 600 mile railway from the Mediterranean to Bagdad " to tap the oil fields of Iraq " we hear the growling answer of the King of Beasts to the challenge of the Bear as he shambles his way over the Pamirs towards India.

" There's a story handed down from Old Methulesem,
I learned it when a little boy at school,

That you make a big mistake and don't forget it,
When you bother around the hind part of a mule.

When you think the animals' getting old and feeble,
If you ever, ever trust him, you're a fool,

For he'll kick you full of holes in seven seconds
Trust him not, there's mischief in the mule."

In other words, don't monkey with a buzz saw. The moral applies also to Lions.

If Great Britain be left out of the picture, the only nation which might come to China's assistance would be Japan, and it is extremely doubtful whether Japan would invite the hostility of a powerful neighbor who has so much to offer in the way of raw materials for her factories and in markets for her manufactured products. The illusion of a wonderful market in China once held by Japanese manufacturers is giving place to a realization that China's financial necessities and anti-foreign tendencies will build up a high protective tariff wall and provoke new taxation and impositions on Japanese industries in China that will make difficult any great expansion of Japanese trade in this country. The Nationalist Government is already deeply concerned over the amount of Japanese investments in China, especially in cotton mills, and is seeking to devise discriminatory taxes to handicap them in favor of Chinese owned mills. The indications are that the Chinese Government will make every effort to cripple Japanese trade and investments.

Japan is determined to live in peace with her neighbors and the world, asking only for a square deal in tariffs that will enable her to solve her pressing population problem by industrialization and foreign trade. Japan is not seeking wars or adventures and as long as her vital interests in Manchuria are not endangered, it is extremely improbable that she would make any more than a perfunctory diplomatic protest to preserve China's authority in regions undermined by Soviet influence and intrigue. There was a time, immediately after the Great War, when Japan was ready to defend Manchuria and China against "the menace from the direction of Urga," but American statesmen and financiers seeking to bolster up China, brought pressure to bear upon Japan to surrender her right to build the Taonan-Jehol railway, designed as her outer line of defense against a Russian advance through Mongolia. The line that the Consortium induced Japan to surrender, has since been built with Chinese money. The defense of the Inner Mongolian regions must now be undertaken by the armies of the War-Lord of Mukden.

America, then brought pressure to compel the cancellation of the Anglo-Japanese Alliance, the one assurance that Russia's ambitions in Asia would be kept within reasonable bounds. The Washington Conference recklessly swept into the waste basket that twenty year old guarantee of peace in the Far East and in its stead signed a lady-like agreement to talk it all over around the tea-table if any of the *insular possessions of the four Powers in the Pacific* were menaced. America traded the peace of the Far East for an assurance of peace in the Pacific and left Japan, China and India exposed to the comeback of Russia. At the Washington Conference the bars were deliberately let down for Russia to have an untrammelled way in Asia, hoping that it would take a couple of generations to recover from war prostration and the debacle of Bolshevism. Weak as it then was, the Soviet took full advantage of our delightful ignorance of Asiatic affairs and within a few years became absolute master in China, dominant in Central Asia and back to where Imperial Russia was before the Great War, with the Soviet railway guards facing the Japanese across the platform of the station at Changchun.

The nagging of Japan continued. Nothing would satisfy the Anglo-American group of pro-Chinese statesmen until Japan surrendered all that she had gained in Asia as the result of her sacrifices in the war. America insisted upon the return of Shantung to China, which Japan never intended to hold permanently, but to use as a trading card in direct negotiations with China to solidify her position in Manchuria. Washington then served notice on Japan that she must retire her armies from Eastern Siberia under the terms of the Allied agreement entered into for the occupation of the territory. America took upon herself the task of protecting the interests of the Russian people, hoping at that time, that Bolshevism was only a transient phase in their political evolution. America has had her way in Far Eastern diplomacy and the results of our interference are now plainly and painfully evident. We saved China from Japan only to hand her over to Russia.

Under certain conditions, Japan might come to the assistance of China, but such action would be confined to a very restricted area. Short of an out and out alliance, another highly improbable eventuality, China could hope for little sympathy or support from a nation she has done her utmost to injure, discredit and drag down to economic ruin. Japan's real interests would be more profitably advanced by some understanding with Russia, than by championing the cause of a government whose policies and propaganda are concentrated upon weakening her power and prestige and teaching the rising generation to look upon her as the national enemy. China can hope for little help from Japan when she is again called upon to face a real issue with a rejuvenated Russia. America and Great Britain demanded that Japan surrender her strategic positions and an alliance that would have enabled her to drive back the Soviet menace from the Far East. We cannot expect Japan at this late date to tackle single-handed the task of freeing China and Eastern Asia from communism after we deprived her of her power of offensive and opened the doors for the Soviet comeback. Japan may be forced to take action to protect its vital interests in Manchuria, but who could criticize or condemn her for safeguarding her present rights and position by some understanding with Moscow.

The future prosperity and welfare of Japan hinges largely upon finding markets for her manufactured products. Japan has reached that stage of industrial development where a booming, progressive, prosperous, and friendly neighbor in Asia will create much needed opportunities for reciprocal trade. The Soviet has recognized Japan's superior technical ability in the repair of railway rolling stock and a Japanese mission is now in Moscow teaching the Soviet engineers their system. Friendly relations between the Soviet and Japan, based on a mutual recognition of each others problems, has undoubtedly brought about an understanding that will keep Japan from interfering in any Soviet program of economic expansion or penetration of distant Chinese territory that does not endanger her own interests.

Japan does not fear the Soviet in a military sense. Supreme in the Western Pacific, friendly with America and Great Britain, invulnerable to an attack from without and with unsurpassed facilities for rapid mobilization and transportation of her armies to any given point in Manchuria, Japan holds the fate of the Far East in her hands. No other Power can or will interfere in this part of the world. The support of Japan to either Russia or China in any given crisis will decide the issue. Moscow has the good sense to recognize the special position of Japan and her preponderating influence in the East and has evinced a willingness to reach an understanding that will at least assure her neutrality in any future dispute with China.

Nanking, fearful of antagonizing public opinion by appearing over friendly to Japan, and blind to the portents of the future, is pursuing a policy which can only irritate and estrange her powerful neighbor. It is hardly probable under these conditions that Japan will ever come to the assistance of China, except to carry out her oft declared intention to defend at all costs her interests and investments in South Manchuria. Who, then would side with China!

Will America come to her assistance? Emphatically, No! America has stood by China in order to preserve her territory and sovereignty intact until she was able to paddle her own canoe. China, in her own opinion, has arrived at that stage of her development and is now demanding full recognition of her sovereign rights. In due time, they will be conceded to her and she must face the consequences. The American Government, more concerned with the inviolability of one of its own diplomatic creations, will invoke the Kellogg Peace Pact, but this will never restrain Russia when again prepared and determined to force an issue with China, any more than it will stand in the way of the United States where its own vital interests are concerned.

In five years from now, American sympathy may or may not be with China. The Soviet is making a tremendous bid for American support and co-operation, and if, in the next few years this leads to recognition, followed by American investments in Soviet concessions, the economic and trade ties so formed will incline a large and important section of American public opinion to side with the Soviet, or at least to advocate complete neutrality. As long as the Soviet minds its own business and refrains from propaganda and radical activities in the United States and the present volume of orders for American materials and technical assistance continues to pile up, American sentiment will be strongly in favor of a nation that is contributing so largely to their prosperity. The majority of right-minded Americans will dislike and condemn the Soviet principles of government, of debt repudiation and interference in the domestic affairs of other nations but the need for markets will overcome any scruples about establishing closer business relations. The latest Soviet move to court American good-will is to establish branch offices of the Amtorg Trading Company in Seattle and San Francisco in order to purchase American equipment and supplies to expedite the program for Siberian development, through quick shipments to Vladivostok by American steamships. These Soviet purchases are creating a new trade outlook for the Pacific Coast States. The rail distance between Moscow and Eastern Siberia is so great and the facilities so poor that equipment can be purchased on the Pacific Coast of the United States and shipped across the Pacific to Vladivostok, Alexandrovsk and Petropavlovsk more cheaply than by the 6,000 mile rail haul across Siberia.

In the last four months, the Amtorg has purchased over $500,000 of canning machinery in Seattle, destined for the crab and salmon fisheries of Kamchatka, while oil well machinery and equipment in large quantities is going from Los Angeles to Saghalin and to the oil fields of the Caspian. The total purchases of American machinery by the Amtorg for the current fiscal year is about $15,000,000. The development of Eastern Siberia will induce American steamships to include Vladivostok as a port of call. The nation that sells must also buy. The trade between the Pacific Coast and Siberia will grow rapidly and constitute another argument in favor of American recognition of the Soviet, another bond of mutual interest and understanding that will neutralize a very important and influential section of American opinion in any dispute between the Soviet and China.

America may be China's friend, but international friendship is nowadays expressed in terms of financial co-operation and business relations. Japan, the nation that China is teaching her school children to look upon as their enemy, is also America's close friend, bound by economic ties and mutual understanding that no Chinese propaganda can again sever. As regards the Soviet, it must not be overlooked that America has indirectly been its best friend. For America's intrusion into Asiatic politics in order to save China from imaginary wrongs, has preserved intact the integrity of Russian territory and permitted Moscow a free hand to pursue unchecked her program in Asia.

Sooner or later, there will have to be an adjustment of claims and counter claims and a revision of both the Soviet and American viewpoint on the liquidation of the old Czarist and Kerensky Government debts. There is too much at stake to permit a clash of fundamental principles to stand forever in the way of some agreement that will bring Soviet Russia once more into closer contact with the United States. It may be calculated policy on the part of Moscow to play up to the United States as she is now doing in order to induce American capital to take up development concessions and create further commercial credits for materials supplied, and although her past record is against her, the bid she is making for American support will weigh heavily in her favor. It is worthy of note that notwithstanding the official ban on loans to the Soviet Government, American businessmen have been quite willing to extend commercial credits to the Soviet for goods purchased, and so far as is known, these obligations have been faithfully met, which makes Americans all the more ready to enter into new contracts. As long as the connection is confined to a purely business basis, this trade will be welcomed by American manufacturers, but when it comes to actually investing large sums of American capital in Soviet concessions, the experience of the British in the Lena Goldfields, Limited, may make difficult any important transactions.

As to communist propaganda in the United States and the possible overthrow of American institutions, we have little to fear. If they can get away with their program in the United States, there is something wrong with our system.

America is leading the world towards disarmament and permanent peace and in any show-down with the Soviet, China can hope for nothing more from Washington than diplomatic support to bring about a peaceful adjustment of the dispute. China stands alone, without a friend or ally she can turn to for material support. The League of Nations or the World Court can exert no influence or pressure upon a non-member state pushing forward an aggressive program in a part of the world inaccessible to outside intervention.

China has about five years breathing spell to put herself in a position to meet the next determined move of Russia; a tremendous task calling for the patriotic co-operation of all factions to establish a central government, suppress banditry and piracy, disband superfluous armies, and prepare to hold her own against the advance of a race determined to find its outlet towards the East and control the destinies of Asia. China can never accomplish this miracle in the short time left to her. Thrown squarely on her own resources and facing the future alone, it may well be that distracted and disunited, she will again turn towards Moscow as the easiest way out of a desperate situation. The Kuomintang Left Wing is honeycombed with communist cells. Large sections of the country are overrun with so-called communist armies. The resumption of diplomatic relations with Moscow will open the doors to another swarm of Red agents and agitators. China is already one third communistic or better said, anarchistic. Moscow or The Third Internationale will never permit this advantage to be wholly lost.

China spurns the help of other nations and demands the right to solve her problems in her own way. She is entitled to that privilege and in exercising it, the present tragedy will be prolonged, until for humanity's sake, even Communism would be preferable to the never-ending civil wars, with their wanton sacrifice of life, destruction of property and impoverishment of the people. As Communism settles down to the serious routine of government, of putting into practice its theories, using the state income for the uplift of the people, betterment of their living conditions, advancement of industry and opening up new sources of community wealth who can say that it is not infinitely superior to a system that grinds, impoverishes, takes all and gives nothing in return, not even protection ?

The experiment now being tried out in the Union of Socialist Soviet Republics, viewed from the standpoint of pure economics is worth serious study. If it accomplishes what it has started out to do in the next five years or even in the next decade, Communism will develop into a force that other governments must mould to their own peculiar political and economic needs.

Soviet propaganda, Soviet politics, Soviet intrigues and secret interference in the affairs of other nations, are a side issue to the amazing program of industrialization and transportation now being carried out in Russia as a challenge to the rest of the world. The Communist Party directing the affairs of Russia has passed through its embryo Marxian stages of political and economic evolution and is now intensely, ruthlessly and violently practical. The main outlets for the products of the Soviet's new industries will be found in Central Asia, China and India. The Soviet program may fall through of its own weight ; other strong capitalistic nations may be able to successfully defend themselves and defeat the Soviet competition, but there is no power in the world that can stop its conquest of Central Asia, Mongolia and North West China. The whole of China hangs in the balance and unless the Government at Nanking is bolstered up from without, Moscow's ambitions may well be realized.

Despite all arguments to the contrary, there is no more fertile soil in the world for the seeds of communism than in China. Nothing could be worse than the present feudal system (except perhaps a Brahmin despotism) that has been fastened upon China by a group of self-seeking militarists. Communism in Russia is nothing more than the revolt of an oppressed people against the thousand-year old tyranny of the Czars, a desire for any change rather than a perpetuation of the old order. Communism as expressed in Soviet Russia, has no relation to the American conception of this revolution in human relations. The people of Russia do not think of it in comparison with conditions in the United States, but with their serf-like status under the Czars. They would submit to death rather than return to the old conditions. Communism, so-called, in China is only another name for the anarchy of despair, a revolt against the intolerable tyranny of rapacious task masters, who have robbed the people of their last copper cash, confiscated their crops and work animals and condemned them by millions to slavery, starvation, hardships, degradation and death.

Due to ceaseless wars to maintain itself in power the Nationalist Government has been unable to make good on its promises to the people to promote prosperity and provide protection. Its failure is as much responsible for the so-called communist uprisings as the activities of Red Agents. The victorious northern march of the Nationalist armies was made possible not by any decisive military victory or superior tactical genius, but by the shouting of slogans imported from Moscow offering the oppressed masses deliverance from their task-masters. Since the Nationalists settled their capital in Nanking their leaders have continued to shout these slogans to keep the masses rallied to their standard. The present communist wave sweeping over the Yangtze Valley is merely the aftermath of a movement that gained headway and imposed its rule upon the country, through the same appeals to the sympathy of the people. Revolution cannot be created from without ; it grows out of internal conditions, and if ever a people had just cause to despair of any betterment in their conditions, it is the Chinese, irrespective of any section or faction. The so-called communist movement in central and South China is a repetition of what happened in Russia ; the cry of despairing humanity against a system that has no more thought for their welfare and happiness than a ravenous tiger has for his prey.

If Nanking cannot establish its authority over the whole of China, and bring law, order, justice and protection to the people, then even a sovietized form of government (if it can be introduced without the atrocities that accompanied Bolshevist seizure of power in Russia) is preferable to a prolongation of the present orgy of misrule. If China is to be saved from falling under the complete domination of its Reds, its only hope lies in Nanking. Inexperienced, Chauvinistic and intensely anti-foreign as it is, Nanking offers to the people of China and to the outside world, the one assurance that a stable government can be evolved out of the present chaos.

If Nanking has failed to better conditions and carry out its original program to the satisfaction of the people, it has not been altogether due to its inexperience. It had just six months to organize itself and get things started, when one civil war after another claimed all its attention and then on top of all this, came the issue with the Soviet over the C.E.R., for which Kirin was solely responsible. We hold no brief for Nanking, but it is only fair to point out that it started its career with high hopes and good intentions and made an honest an commendable effort to solve its most pressing financial and transportation problems by engaging the services of a group of the best experts that could be secured in the United States. Nanking looked forward with some legitimate expectation that financial assistance would be forthcoming from without when its program was definitely formulated according to the advice of these experts. At no time since March of last year, has Nanking been able to turn its attention to purely constructive and rehabilitation measures. All its energies, all its revenues and credit has gone into the struggle to preserve its authority. If China is ever to be a united nation, holding her own amongst the other Powers and discharging its international obligations to the satisfaction of those with whom she has treaty relations, some government must exercise supreme jurisdiction. Whether this power be wielded by a government headed by Chiang, Yen, Feng, Chang or some other leader, matters little in the long run. The Foreign Powers have recognized the government headed by Chiang Kai-shek, which at least professes certain ideals and ethics that other nations can support. Nanking's failure has not changed this picture in the least. No Government, no matter how strong, can carry on a major fight for its existence in one section of the country without denuding other sections of troops and inviting lawlessness, bandit uprisings and Red depredations. Nanking, despite all its shortcomings is still worthy of this support.

The Powers interested in the peace of Asia should continue to extend every moral, material and diplomatic assistance to Nanking in its efforts to stabilize conditions and build up its power of resistance against forces that if not neutralized within the next five years, will become too strong for China alone to counteract.

Nanking, if it is wise, will cease all anti-foreign agitation, and apply itself to its main task of giving the country a stable and efficient government. If there is any real statesmanship in the Nationalist Group, it will seek by every means within its power to conciliate and make a firm friend of Japan, the nation that for the next two or three decades will have the final say as to who shall be Master in Eastern Asia. The day is not far distant when China will need Japan's friendship and support.

"The menace from the direction of Urga," so laconically and diplomatically stressed by Viscount Chinda in 1920, when Japan was fighting to retain her rights to the Taonan-Jehol railway concession, looms larger with the years. The time will come when American and British statesmen will have cause to regret having broken down the barriers that kept this menace in check. Japan, like Russia, has made prodigious progress and is more powerful, more determined, more respected, more feared than she was ten years ago when the full weight of Anglo-American diplomacy and propaganda was exerted to break her hold on China and discredit her before the world. Japan now enjoys the full confidence of the other great naval Powers. No American army will ever cross the Pacific to fight by the side of China ; the American battle fleet will never leave its Home waters to make a demonstration in this part of the world, Japan with the consent of the other Powers will be permitted to take such action as her own best interests seem to dictate. The handwriting on the wall is clear for all to read and heed. Japan is now the dominant factor in the Far East. On how she swings her friendship and support to either the Soviet or China hinges the future of Asia and the fate of China.

The Chinese Eastern Railway

Mid-Summer Thoughts on a Red-Hot Subject

The dog-days have come again and as usual at this season, somebody in Europe develops a brain storm about the Chinese Eastern Railway and starts the rumor that a nameless American financial group is trying to acquire the property from the Soviet. This year, the story telegraphed from Berlin, has gone the rounds of the press and evoked the usual surface anxiety in Japan. The German rumor is to the effect that the Soviet Government is negotiating to buy all the French shares in the Russo-Asiatic Bank at 67 per cent. of their face value with the object of selling them to an American syndicate who will then pay 42 per cent. of the purchase price of the C.E.R. to the Soviet, whereupon the line will be operated as a joint Sino-American enterprise. Whoever started this latest rumor, at least had a fairly intelligent grasp of one almost insurmountable difficulty surrounding China's purchase of the line by means of an international loan; always provided, that the Soviet Government consents to surrendering its interests in this manner.

At the height of the Sino-Soviet conflict last summer, interested parties unofficially approached the American Government and bankers to ascertain their attitude towards an American or international loan to China for the purpose of purchasing the Soviet's rights in the C.E.R. Such a proposition could be handled in the United States only by the official American Group in the Consortium and with the approval of the State Department and then communicated to the other groups and referred to their respective governments. The veto of any one of these three Powers, (Great Britain, France and Japan) would be sufficient to kill the project, for although any one group can go it alone if the others decline to participate, no American group would underwrite such an important Chinese loan without the co-operation of the others, and, where Manchuria is concerned, a full understanding and partnership with Japan.

Although inactive since its birth, the Consortium is by no means dead. The Chinese cherish the illusion that by withholding official recognition, they destroyed its usefulness, but until its dissolution is announced, this international grouping of bankers stands as the official instrument of the Powers concerned in dealing with Chinese finances and its chairman becomes in point of fact the official spokesman for the four governments in any matter involving the credit of the Chinese Government. This position is held by Mr. Thomas W. Lamont of J. P. Morgan and Company. Mr. Lamont went out of his way last year to attend the meeting of the International Chamber of Commerce held at Amsterdam in order to deliver an address on China's financial difficulties. In a polished, sympathetic but forceful ten-minute statement, he told the Chinese that they could expect no financial assistance until they put their house in order, established and consolidated the authority of a Central Government, evinced some willingness and intention to pay defaulted loans and commercial debts and respect revenues pledged for the service of past obligations. Conditions in China have not changed for the better since last July.

From the Chinese viewpoint, the purchase and incorporation of the Chinese Eastern Railway into their own system of state railways is essential to restoring their full sovereignty over Manchuria, the first step towards bringing pressure to bear upon Japan to sell the South Manchuria line and surrender the Liaotung Lease. But in both the 1924 and 1925 Agreements between China and the Soviet, it was stipulated that China could purchase the Soviet's interest in the line only with Chinese capital and, furthermore, that no third party should interfere in the future of the line. Neither side can therefore enter into negotiations for the sale or surrender of their interests without first obtaining consent of the other. The mere mention that China wanted to buy the Soviet interest in the line last year, evoked such a prolonged cachinnation from Moscow that it is hardly conceivable that within a year the Soviet would reverse its attitude towards a property so essential to the success of its immense plans for the rapid development of Siberia and Central Asia. Instead of loosening its hold, it would not be surprising if Moscow demands the cancellation of the Peking and Mukden Agreements and a return to the original status of the line.

Owing to the Soviet's repudiation of the old Czarist and Kerensky debts, the French, who for many years financed Imperial Russia, now claim an equity in the C.E.R. as being the only Russian property of any value outside the jurisdiction of the Soviet. Although the French have no legal claim, it is obvious that if the Soviet should ever consent to sell the property to China and accept the proceeds of a foreign loan in payment for its rights, such a loan would be stubbornly opposed by France unless some assurance be given that her "equity" be liquidated. Now, it is possible to raise such a loan through a British, American or Japanese group, but it is extremely doubtful whether these groups would double-cross their French partner in such a cold-blooded manner. It does not require any elaboration of the situation to understand that the French will never participate in a transaction that would benefit the Soviet financially unless some part of the money so raised is set apart to satisfy her claims. As such a loan would have to be international in character, with full participation for French interests, it is again obvious that until the Soviet is willing to hand over the proceeds of the loan to France, this solution of the problem stands no more chance than the proverbial snowball in hades. By the same reasoning, it is highly improbable that the State Department would give its approval to an American loan to the Chinese Government whose proceeds would be handed over to the Soviet, until such time as the latter is willing to acknowledge and repay the debt of the Kerensky Government to American investors. The situation is very similar with the one which makes impossible French participation in such a transaction. Therefore, there is some slight basis for the recent Berlin rumor, probably inspired by Paris, to force a statement from Moscow in order to keep the record straight.

China is very anxious to purchase the line, if the Soviet will consent to sell, but until some agreement is arrived at for the liquidation of the French equity, the proposition seems hopeless. On the other hand, if it were true, now or at any time in the future, that the Soviet Government is disposed to accept an American or international loan in payment for its rights in the C.E.R. and to hand over the line to China and America, relinquishing control over its main artery of traffic, there must be some compelling reason other than financial, to explain this sudden abandonment of Russian policy. At the precise moment when the Soviet is spending billions of dollars to expedite its great development program, involving complete rehabilitation and modernization of the Trans-Siberian railway, why should it be willing to surrender the main link in its through transportation scheme for a problematical share in a paltry $350,000,000. Beware of the Greeks bearing gifts!

The explanation, if there is one, must be predicated on the supposition that the Soviet has thrown overboard the traditional Muscovite aims and aspirations in Eastern Asia and intends to concentrate its political and economic activities in territory West and Southwest of Baikal. Thirty million Chinese ruled by a group of bellicose war-lords, backed up by the determination of Japan to protect its vested interests in Manchuria, has erected a formidable barrier against any Soviet advance in that region. But there is no such obstacle to Soviet penetration into Mongolia and Hsinkiang. There, in Central Asia, the Soviet is supreme and can be reached in a military way only by a Chinese army using the Chinese Eastern Railway to invade her territory from the east. Now, if the C.E.R. was handed over to an American or international group, thus effectively neutralizing its value as a strategic instrument, the Soviet could work out its program in Central Asia safe from any possible outside interference. On the other hand, all this could be avoided by holding on to what she has and demanding a return to the pre-1924 status.

An American loan to China to acquire the Soviet's rights in the C.E.R., means an international loan and the neutralization of North Manchuria, a precedent for bringing the same pressure to bear upon Japan to surrender the S.M.R. to the same group. This brings Japan, the real Power in the Far East, into the picture. In the first place, it can be categorically stated that the official American group would decline seriously to discuss such a matter with China

. . BUY IT FOR ME, UNCLE SAM, IT COSTS ONLY SEVERAL HUNDRED MILLIONS,!...
CHINA
SOVIET
NEGOTIATIONS WITH U.S.A.
MOSCOW CONFERENCE
SAPAJOU

(*North-China Daily News*)

The Pointsmen on the C.E.R.

without a full and frank understanding with their Japanese partners. Unless Japan is willing, the deal falls through. So, when we hear that an American group is negotiating either with China or the Soviet for the purchase of the C.E.R. and the Japanese express astonishment, it is safe to conclude that the story has no foundation in fact. It is inconceivable at this juncture that any American financial group would waste its time over a proposition that without Japan's approval and participation, would receive little encouragement from the State Department. On the other hand, should the Chinese succeed in interesting an American group in such a loan and should the Soviet Government intimate a willingness to forego its rights under the Peking and Mukden Agreements and accept payment from the proceeds of such a loan, there is no doubt it would prove highly attractive as a purely financial proposition, but investigation and study would uncover so many political obstacles as to compel its abandonment.

In the first place, the $350,000,000 valuation put upon the property by the Soviet is prohibitive, even though the line could be made to pay the interest on the loan and leave a handsome surplus. According to Russian reports, the line actually cost about $175,000,000, but against this is set the fact that it was never intended to earn a profit or to serve its fundamental utility of developing the territory traversed. It was conceived as a strategic weapon under the terms of a secret alliance between China and Russia signed in May, 1896, for the exclusive purpose of carrying out the terms of this alliance and facilitating the transport of the Russian armies to points on the Korean frontier, preparatory to a war with Japan. Had the Japanese known of the existence of this alliance at Portsmouth, they would have been justified in demanding the whole of South Manchuria from China as an indemnity for her share in bringing about a war that could never have been fought, had the Russian armies not been entrenched in Chinese territory. Despite the findings of voluminous expert reports compiled for the Washington Conference that the legal position of the C.E.R. is defined by the commercial convention of September, 1896, the real status of the line was clearly determined by the terms of the secret alliance signed four months previously and revealed officially to the world, a few days after the above expert report was submitted to the Conference.

That the C.E.R. was not expected to pay a financial return on the investment is clearly indicated by the fact that for twenty-four years it never covered expenses, the deficit being met annually from the Imperial Russian Treasury. Not until its administration was turned over in 1922 to a new joint board of directors headed by Dr. C. C. Wang, one of China's most competent railway administrators, did the line show a profit from operation. Since then, the annual profits of the line increased steadily and in such a proportion that by 1930, they should have been well over $15,000,000 gold, with the prospect of increasing this steadily to twenty or twenty-five millions, or ample revenues on which to secure a loan to cover the actual costs of construction, subsequent improvements and appreciation in value.

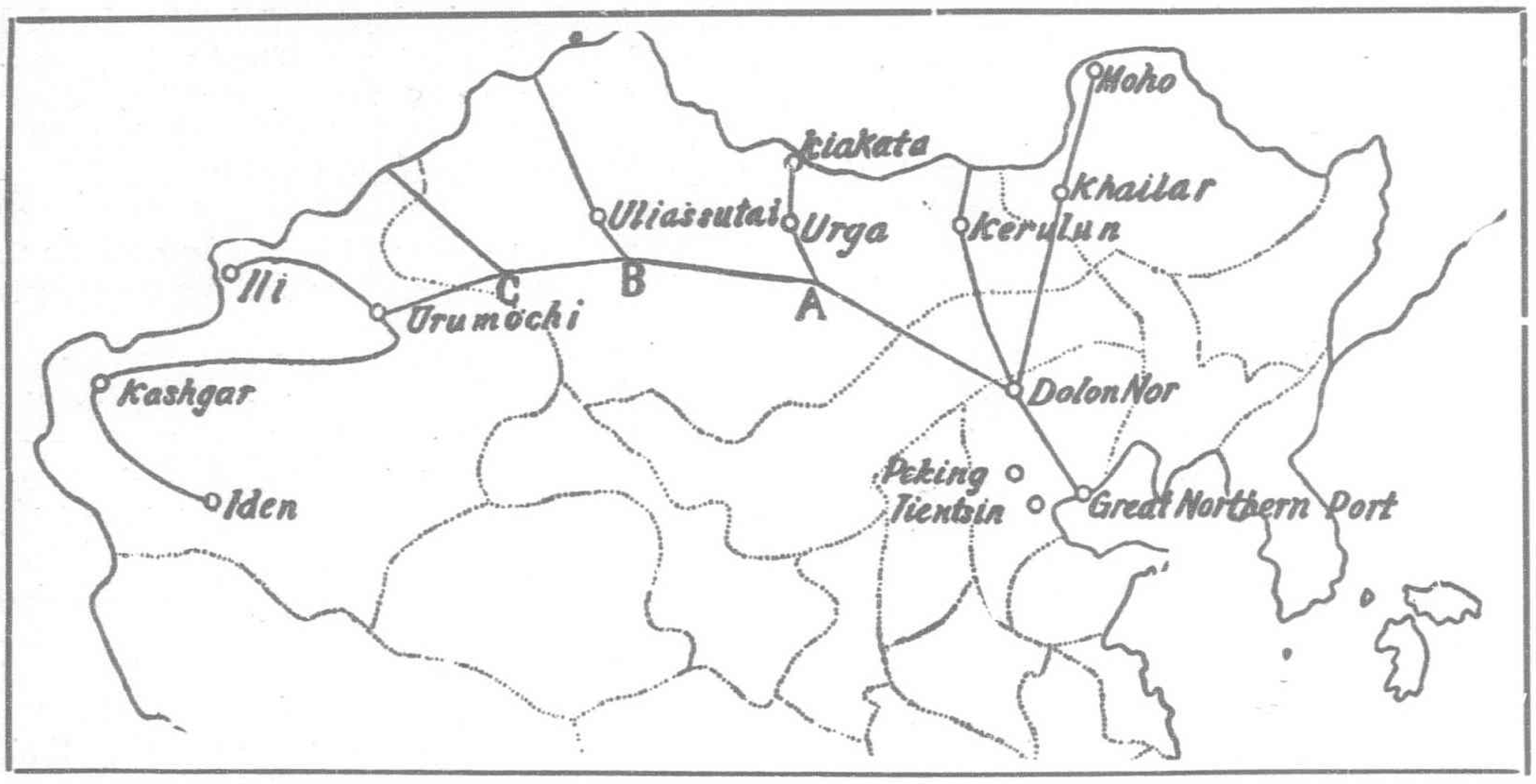
Now, just at the moment last year, when American bankers were considering the possibilities of a loan to China for the purchase of the Soviet interests, basing their calculation of the size of the loan on the alleged cost of the line ($175,000,000), Mr. Mantell, the railway adviser to the Nationalist Government, gave out an opinion which was broadcasted over the world, that the line could easily earn $30,000,000 or more a year. Naturally, such a statement coming from this source, made it possible for the Soviet to value the property based on its earning capacity, and when we are now informed that Moscow places a $350,000,000 valuation on the line, the Chinese have no just cause to protest against a valuation their own expert has indicated as most reasonable. If the C.E.R. was absolutely essential to the future prosperity of China; if it was the only outlet to the territory served, it might be good economic and political wisdom on the part of China to acquire it at any price. On the other hand, standard gauge railway construction over the level Manchurian plain should not exceed $30,000 (gold) per mile and allowing for even $100,000 a mile over the Kinghan mountain section, the Chinese could duplicate the C.E.R. for an average cost of $50,000 a mile, or a total of about $50,000,000, providing they are foolish enough to build another railway that diverts the trade of Manchuria to a port outside their own jurisdiction. The same amount of money expended in extending the present system of Chinese lines in Manchuria, tapping and opening up the Amur, Hailungkiang and Inner Mongolian regions and carrying their produce southwards towards Newchwang or Hulatao, would serve China's real interests to a greater degree than taking over a line whose deep-water outlet at Vladivostok can be reached only through Soviet territory.

It is a remarkable commentary on the whole C.E.R. controversy and the many expert reports on its valuation, that no one to date has challenged the Russian figures as to the total cost of construction of the Manchurian cut-off of the Trans-Siberian trunk line, which is placed in round numbers at Roubles 350,000,000*. As a matter of fact, this figure actually represents the original official estimate of the cost of the seven sections of the entire Trans-Siberian line from Cheliabinsk to Vladivostok *via* Stertinsk, Blagovestchensk, Khaborvsk and the Ussuri River. The official estimates covering every conceivable item of land purchase and expropriation, buildings, administration, construction, telegraphs, telephones, rails, bridges, rolling stock, etc., for the entire 7,112 versts, was exactly Roubles 350,210,428, or an average of Roubles 49,242, per verst, or say, $34,000 gold per mile. When the Russian engineers based their official estimate on this figure and carried out the main Trans-Siberian construction within its limits, it is difficult to understand how the 1,000 mile Manchurian cut-off could cost as much as the entire Trans-Siberian system. Our estimate of $50,000 per mile, or $50,000,000 to duplicate the C.E.R. as it stands to-day, is conservative, one that would leave a profit of from ten to fifteen thousand dollars a mile to any experienced constructor who took the job on a lump sum basis. As a matter of fact, the late George Pauling agreed to build the entire Chinchow-Aigun Railway at a lump sum cost of $40,000 gold per mile, and this included a liberal profit. Some of the lines since built by Sino-Japanese engineers in the same territory, has cost about $25,000 gold per mile. So why pay the Soviet $175,000 a mile for a line that can be duplicated for one-sixth the cost?

We have no hesitancy in saying that under competent direction and honesty in handling the funds, that the amount of money involved in purchasing the Soviet's rights in the C.E.R. at the alleged original cost of construction of $175,000,000, would not only build the seven thousand miles of Mongolian and Manchurian defense lines of Dr. Sun Yat-sen's development scheme, but construct the Great Northern Port as well. To talk of double that amount ($350,000,000) as indicating the value of the property, is idiotic.

---

* According to the Soviet official C.E.R. accounts, the total cost of construction of the road was U.S. $223,332,502, including the cost of the South Manchurian branch to Dairen, amounting to $40,507,732.



CHINA'S ONLY ANSWER TO THE SOVIET FIVE AND FIFTEEN YEAR PROGRAM

Sketch Map of Dr. Sun Yat-sen's scheme for the Defence and Colonization of Manchuria and Mongolia, covering about 7,000 miles of new railways across practically level territory. These lines could be built at an average cost of $25,000 per mile.

It is only necessary to glance at the attached map, to realize that Dr. Sun Yat-sen's scheme of Manchurian and Mongolian defense and colonization railways, radiating from his proposed Great Northern Port, is not only the sole strategic guarantee that China's integrity will be preserved in these regions, but that its vast trade will flow into and out of a port entirely under Chinese jurisdiction. The purchase of the C.E.R. at a figure that would make possible this great dream of the man whose ideals, aims and aspirations are now the guiding principles of the recognized government of China, is a betrayal of all that he fought for during his lifetime. Dr. Sun-Yat-sen was the only Chinese who envisaged the future " menace from the direction of Urga" and outlined the plans for his country's defense.

If the C.E.R. is ever taken over by an American or international syndicate as security for a loan of $350,000,000, there will be some provision in the agreement protecting the property against competitive lines diverting the traffic from its territory. No hard-headed group of practical business men would dream of advancing $350,000,000 or even half that sum on a property whose main source of revenue would be dependent upon the through Trans-Siberian traffic and place their investment at the mercy of a government which at any moment could divert this traffic over its Amur line, isolating the C.E.R. and transforming it from a main artery of world communication to a purely local line with no outlets or terminals. This constant menace would make imperative that the C.E.R. under Chinese-American or international direction, should have every facility to extend branches in all directions and be connected up with the general system of Chinese railways in Manchuria, with their outlet within Chinese territory, either at Hulutao or the proposed Great Northern Port of Dr. Sun. This again would suggest that the safety of the investment calls for international control of certain Chinese key lines in Manchuria which would serve the C.E.R. as an outlet without using the S.M.R. and the port of Dairen. With the ever present possibility that the Soviet might divert its through traffic over the Amur Railway and change the status of the C.E.R. to a local line whose only outlet would be over certain Chinese railways, the proposition loses much of its attractiveness.

Now, the security for such a loan, under the present condition of China's finances and credit, would necessarily have to be a first mortgage on the physical property and earnings of the line, and as China has no other assets or revenues to make up any deficit, the bondholders would demand as additional safeguards, complete control of the administration, finance and operation of the line with guarantess of police protection such as China at present cannot extend. On the other side, the Chinese with their ideas of sovereign rights and natural desire to handle the finances of the line, would never consent to such terms, nor could they guarantee to the satisfaction of any foreign investor that efficient police protection would be forthcoming. The negotiations would come to a deadlock.

In the words of a prominent American financier, "we are not building any more railways in China for the militarists to play with." In regard to an American loan for the purchase of the C.E.R., another well-known banker suggested that the only acceptable guarantee for the profitable operation of the line under an international loan agreement, would be to hand its management over to the South Manchuria Railway organization and operate both systems as a unit under the guarantee of Japanese protection, or consolidate all the Manchurian lines under an international control, supervised by Japanese experts ; which is only the Knox Neutralization Plan reconstructed to meet conditions created by China's inability to stabilize her government, guarantee protection against bandits and military seizure of the property.

Although such a solution might conceivably be acceptable to Japan, it would never appeal to the Chinese, or, for that matter, to the Soviet. So, any way we turn in discussing the sale of the C.E.R. we find ourselves up against a stone wall. The Soviet Ambassador at Berlin has advised the Japanese Foreign Office that there is no truth in the report originating in Berlin. This settles the matter until some tyro in Far Eastern affairs gets another brainstorm.

In conclusion, it is well to bear in mind that the Soviet is in no mood to placate further the Chinese. In an ill-timed gesture, designed to promote Soviet influence in China at the expense of the other Powers, Moscow generously surrendered its extraterritorial rights and a half interest in the administration of C.E.R. to the Chinese, The Soviet has since been compelled to undergo the humiliating experience of being repeatedly and vigorously kicked on a very sensitive part of its anatomy by a succession of provincial Chinese war-lords and their underlings. Within five years, the Chinese seized every other Soviet property in the C.E.R. zone. Deprived of extraterritorial protection, Russians were denied legal protection, persecuted, abused, treated like cattle, and subjected to outrage and indignities such as no white race ever before experienced at the hands of Asiatics.

All through this ordeal, the Soviet did nothing but protest diplomatically to a government who could not control the actions of the Kirin Tuchun. This military despot believing that Moscow was impotent or afraid to assert its rights, very properly, according to the time honored Asiatic conception of politics, administered the last resounding kick to the Soviet's anatomical hinterland, by ousting her from control of the C.E.R. The Soviet is still rubbing the sore spot and applying ointments to the bruise. Its prestige has received a severe jolt. Before it can proceed with its plans in Central Asia and retrieve its lost influence over the peoples it hopes to dominate, it must recover its lost honor. This will not be facilitated by selling the C.E.R. to China, an act which will be interpreted throughout Asia as an open acknowledgment of weakness, a recognition of China's superior strength.

It is all very well to advance the argument that the Soviet has much to gain by retaining friendly relations with China, even to sacrificing her interest in the C.E.R. Moscow tried this once and is smarting from humiliations heaped upon her as the result of her magnanimous diplomacy. We do not envisage any further sacrifices on the part of the Soviet in order to curry friendship with China, concessions that in the very nature of things will be interpreted as a confession of weakness and undermine her influence with the Mongols and tribes of Central Asia. On the contrary, all signs point to a hardening of Soviet policy, a determination to regain her lost prestige and assert her supremacy in Asiatic affairs. There is no other interpretation to her feverish activities in pushing to completion her Five and Fifteen Year Plans, for the development of her Asiatic territories.—G.B.R.

Again; Poor Shensi!

In a discussion at the Williamstown Institute of Politics over the famine in China, Mr. Grover Clark, formerly connected with the China International Famine Relief Commission, estimated that deaths from famine in China these last five years equalled deaths from all other causes; one of the greatest calamities that has ever befallen mankind. Millions more are doomed to perish unless they receive outside help, said Mr. Clark. Mr. George E. Sokolsky, challenged Mr. Clark's statement and insisted that grain given to relieve this suffering, merely prolongs civil war in China. "*The National Government,*" *he said,* "*does not desire such donations.*" Mr. Sokolsky's main statement is supported by the reports of actual conditions in the famine area.

That Feng Yu-hsiang and his armies are mainly responsible for the terrible famine conditions in Shensi, is attested to in the report of Mr. Harry S. Aldrich, an American who has been in charge of the work of The China International Famine Relief Committee in that province. Mr. Aldrich's statement, fully endorses the findings of the American Red Cross Commission and our own presentation of the facts.

Mr. Aldrich says that it is futile to attempt famine relief on a large scale in China under existing conditions. The money contributed by the American people and turned over to the C.I.F.R.C. for distribution has been largely wasted through military interference, banditry, opium-growing, and corruption and inefficiency among Chinese employes of the commission. "If Americans could see what was being done with their money in Shensi, they would be disillusioned," Mr. Aldrich, says: "The C.I.F.R.C. has attempted in good faith, perhaps, but in a rather bungling fashion, to distribute the funds, but the odds are all against the commission."

"Military and civil officials are indifferent at best, and at worst actively interfere with the work. During the Spring and Summer, the Famine Commission, in the face of all sorts of interference, succeeded in getting about 3,000 tons of grain into Shensi. But during the same period, we who looked on for two months and the missionaries who helped the commission throughout this period, are in agreement that Marshal Feng Yu-hsiang took as much and probably more than this amount of grain out of the province for his armies. So the commission was merely replacing grain seized by the military, and the contributions in America and China were in effect helping underwrite the past and present wars."

In summing up the causes underlying the famine, Mr. Aldrich bluntly states: "The famine in Shensi was due more than anything else to the depredations of Marshal Feng Yu-hsiang, the so-called 'Christian General.' In 1926 and again in 1928, he practically stripped the province of grain, including grain reserves. If this grain had been left in the province, the famine would not have been nearly so great as it was last winter. Military depredations and banditry are the chief causes of famine in Shensi. Opium growing is also a considerable factor. These factors exist to-day, just as they did in 1926 and earlier. If there is another famine this winter, these factors must be given the principal blame."

"It is certainly significant that even at the height of the famine in Shensi last winter, the famine area did not include the entire province, but was restricted to a narrow belt running east and west through the middle of the province and extending somewhat to the north of this belt. The famine area corresponded almost exactly to the main billet areas and lines of march of the armies retreating from and advancing to the civil wars in the East."

A further letter from a missionary worker in the famine area, dated Sianfu, August 12, to the editor of the *Peking and Tientsin Times* corroborates Mr. Aldrich's report of the month previous. The picture painted is a harrowing one. The following extract from his letter is almost unbelievable:

> "In a country where the women are regarded with great inferiority, it is natural that they and the children would be the main sufferers in a famine. It has not been a strange thing to see men selling both their wives and children on the street to the highest bidder, who would probably give him enough money to live another week or so. At our girl school at Hingping, babies were constantly left at the gate.
>
> "Probably the saddest result of the famine is the stimulus it has given to the white slave trade. Especially in districts where the famine has been most intense the girls and women have been sold and then in most cases brought out of the province. While the victims have suffered, others have grown rich on this awful trade. It is roughly estimated that about 40,000 young girls and women have been sent out of the province and later sold in the provinces closest to the coast. A head-tax of $9.00 has been collected for women thus "shipped" out of the province. It can only be imagined what lives of infamy are awaiting these women and young girls."

Further on in his letter, he says:

> "Following are the estimates as to famine suffering; the largest estimate of deaths due to famine in Shensi province only, is three million. The smallest is two millions. I think the middle ground of about two and a half million would be correct. About half a million people have left the province. At the present time 80-90 per cent. of the population are seriously affected by the famine; *If we take the whole famine area I am sure it is not too little to estimate five millions as dead.*"

We cannot go behind this testimony. That five million people have died of starvation and their women were sold into lives of infamy and slavery and a "likin" tax levied on their shipment out of the province, in order that the armies of one War-Lord could be fed and munitioned, is perhaps the greatest crime against humanity recorded in the history of the world.

Mr. Sokolsky declared in another Williamstown discussion; "that China's wars must continue until the feudal groups are destroyed, which holds true," he added, "whether one considers the well equipped northern armies or the bandits to the south. The process may require many years," he said.

The price that the Chinese have already paid to bring about national unification is staggering in its toll of death, destruction and impoverishment. If it is true that Nanking does not desire outside donations to succor the starving millions of Shensi, for fear that the food will fall into the hands of Yen or Feng, and so prolong the war, then the horrors of the Shensi famine must be added to the price of unifying the country under the rule of Nanking. To convey the ultimatum to the people of Shensi that they must resign themselves to death and further degradation for their wives and daughters, pending the problematical final victory of the Nationalist armies, is sufficient justification for the Great Powers or the League of Nations to intervene in the name of Humanity to prevent such a callous and wanton disregard of the rights of these defenseless millions. If a province as large as many European or Latin American states is to be devastated and its people, exterminated to further the pacification of the country under any one faction, the future holds out little hope for a contented and united China. Caught between the upper and nether millstones of two powerful military systems "Poor Shensi" will stand in the pages of history as the most appalling horror ever inflicted on a defenseless people, surpassing in inhumanity the bondage of the Children of Israel under Rameses the Great. The lowly Chinese of Shensi alas are not like God's Chosen people; they have no Moses to commune with Jehovah and bring down plagues and the *Pasakh* to deliver them from their oppressors; no Lord of Hosts to fight their battles, and open a passage for them to a new Land of Promise. Shensi has no Patrick Henry to stir its people to rise against their overlords; no paid propagandists to present and plead its case in Washington, London or Geneva.

The Cradle of the Chinese Race, the ancestral home of the Sons of Hans, lies outside the pale of Humanitarian laws. Even the defenseless Armenians massacred wholesale by their fanatical Turkish overlords, found champions in High Places who stirred the world in their behalf, enlisted the support of Great Powers for their protection and let loose the flood gates of charity for their relief. But the agonizing moans of despair that come out of Shensi falls on deaf ears. No succor can reach the millions doomed to die that China can be united.

Nanking may feel that the end justifies the means, but the people of Shensi have also a right to be heard when their very existence is at stake. *The Far Eastern Review* has faith in Nanking, convinced that it offers the one hope of establishing a government that will eventually unite all factions under one head, but we reject the dogma that the Nationalist Party has a Mandate from Heaven to impose its authority over the whole country by the sword, or that it is justified in opposing for its own political ends any outside relief that might reach these millions who otherwise are doomed to perish. The price is too great for Nanking to pay for unification. The day of reckoning will come if such a program is adopted and announced to the world.

Shensi is the Northwestern gateway into China. From time immemorial the savage hordes of Mongols and Huns have swept down from the plains of Central Asia through this opening in China's Wall and conquered the country. In five or ten years, the loyalty of Shensi may again determine the fate of China, for if the Soviet tide is not strong enough to break through the Manchurian dykes, it will, like any other natural pressure, find its outlet at the point of least resistance. That point lies in Kansu and Shensi, whose people have perhaps paid the greatest price to date towards the perpetuation of the feudal system and the procrastinated unification of the country. The flimsy racial ties which bind these two provinces to the main body politic of China may stand the strain of this callous indifference to their sufferings. On the other hand, it may not. Given the arms they would fight for the right to exist. There is no barrier between Kansu, Shensi and the lands of the Soviet. Red agents will find here a field ripe for their activities. Even if they had only the spirit of a louse, the instinct of self preservation will do the rest. Who knows ? Sianfu may become the capital of an independent Shen-kan State, under the powerful protectorate of Moscow. History may repeat itself and Sianfu may again even become the Capital of China. *Quien Sabe.*

G. B. R.

* * *

As this article goes to press, we read a report of Mr. John Earle Baker, director of relief operations of the China International Famine Relief Commission at Sianfu, the capital of Shensi Province. The mere presence of Mr. Baker as the head of this great humanitarian task is a sufficient refutation of the statement that Nanking does not desire donations to succor the starving millions of Shensi. Mr. Baker was recently re-engaged by Mr. Sun Fo as the Adviser to the Nationalist Ministry of Railways and no sooner had he arrived in China to take over his new duties, than he was loaned to the C.I.F.R.C. direct its relief work in the stricken provinces. Mr. Baker's salary and expenses are paid by the Nanking Government and he is therefore as much a representative of that government as he is of the Commission whose funds he is disbursing ; a double guarantee to the people of China and America that their relief contributions are being distributed as efficiently and as wisely as the prevailing chaotic conditions permit. Obviously, Nanking could not very well send one of its own representatives into a district held by its political enemy, so it has done the next best thing by sending an American whose long experience and reputation for upright dealing in China, is an assurance that as far as possible every cent contributed for relief will be judiciously and honestly spent for that purpose.

Mr. Baker inclines to the belief that the C.I.F.R.C. is the best bandit suppression force in North China, not because it organizes armed battalions to round up and destroy the bandits, but because by appealing to them directly in the name of the people he has received passports of safe conduct and a proclamation to respect the Commission's flag.

Mr. Baker confirms what is apparent to all expert observers of internal conditions in China He says : " The bandits are not bandits because they are criminals, but because they are confronted with absolute starvation and inability peacefully to go to work as they would prefer and when a job is given to them, they no longer are bandits. The end of internecine strife in China automatically would do much to end the bandit wave."

In another part of his report he says : " The actual tangible results in famine preventive work completed, and families fed and saved from starvation are so overwhelming when compared to the incidents which can be the subject of complaint, that the latter pall into insignificance."

There would seem to be some difference of opinion between Mr. Aldridge's conclusions and those of Mr. Baker as to the efficacy of the relief measures, but not as to the causes or the need for further contributions. The people of Shensi are starving and although much is being done to better their condition, millions more are doomed to die unless relief comes from the outside. We repeat what we had to say in out June issue that if the Chinese would settle their internal difficulties by compromise and appeal to the outside world for relief, it would be quickly forthcoming.

Soviet Influence in China

Address at the Conference on Russian Affairs of the Institute of Politics, Williamstown, August 2, 1930

By *GEORGE E. SOKOLSKY*

In the short time allotted to me I shall be able to touch only on those relationships between Soviet Russia and China which are of immediate importance in the general orientation of Chinese political life.

As you are undoubtedly all aware, the Kuomintang and the Third International entered into an agreement for co-operation, in accordance with which the Kuomintang was reorganized on a Bolshevik Party basis, the Nationalist Government in Canton was reorganized on a Soviet basis ; and the Nationalist movement of China took on a new lease of life to a very great degree under the guiding advisorship of Mr. Borodin, who contributed all his experience and knowledge to the success of the Nationalist movement which in a short period of three years was able to achieve the conquest of the whole of South China and the possession of the metropolis of Shanghai. One would have to be altogether untruthful to minimize the significance of this alliance or the debt of gratitude that Chinese nationalism owes to Mr. Borodin and his associates.

Nevertheless, in the summer of 1927, it was necessary for the Nationalist movement in China to separate itself from the Third International which was seeking not to support Chinese Nationalism, but to establish the control of China by the Communist Party of China which would create peasants and workers Soviets, which would sovietize the army, and which would trample upon Chinese traditional social life. The separation which took place embittered the relations between Nationalism in China and Soviet Russia, particularly as the Nanking government was definitely organized as a nationalistic bourgeois government opposed to Communism and unfriendly to Soviet Russia. From that date to this, the Third International, through the Communist Party of China and through individual Chinese agents, has been making every effort to destroy the Nationalist government as Nanking and to prevent the modernization and stabilization of China on a peaceful basis. The Communist Party has particularly been active among the peasants of South China ; and although there have been independent peasant uprisings in the North under the leadership of small landowners and Chinese intellectuals, the Communists have sought to synchronize all uprisings with their own movement and to join forces with bandit groups through South China.

It is only natural that under the conditions which prevail in China, in the circumstance of a government inheriting eighty years of disturbed conditions since the Taiping rebellion, that in the short period of three years it would not be able to create a military machine sufficiently powerful to fight military feudalism in the North, which persists for reasons not solely political, and the union of Communists and bandits in the South.

I read from a description of this Communist revolution in Number 21 of volume 10 of International Press Correspondence, a Bolshevik propaganda organ :

> "Thanks to this favorable situation, the Chinese Red Workers and Peasants Army has grown enormously. It numbers to-day thirteen armies of over 100,000 men, distributed over the various Soviet territories. Their weapons and equipment are fairly good. In addition to the Red Army there is, for example, in Kiangsi in the area in which the Third Red Workers and Peasants Army rules, the Red Defence, consisting of nine formations, each numbering 5,000 men."

I do not care at all to be responsible for these figures, which I believe to be ridiculously exaggerated, but they are interesting because of the following statement in the same publication :

> "The leaders of the Cadres are the leaders of the workers and peasants who have already experienced the great Chinese revolution ; they all work under the direction of the Communist Party."

Then, after an explanation as to why this army is invincible, the writer states :

> "But all these attacks (on the Communists) prove in vain in face of the upsurge of the Chinese revolution, the revolutionizing of the world proletariat and the victorious consolidation of the Soviet union."

Ladies and gentlemen, if I had hours to spend on this subject I could talk to you in detail of the horrors that are being brought to China by Soviet activity in South China ; I could speak to you about the danger of China losing the whole of Turkestan through the economic penetration which is now taking place in the province of Sinkiang ; I could speak to you of the dangers to Manchuria from the Communist development in Mongolia ; but my time is limited, and perhaps these questions may be referred to elsewhere.

I need only say here that China does not interfere with the internal affairs of Soviet Russia. China does not stand in horror nor does she rise in moral indignation at the Soviet political or economic system, which appears to the Chinese mind not more peculiar than some of the economics and political systems of western countries. China realizes the importance of a friendly neighbor across her long frontier on the North. But in China's effort to find a basis for peaceful modernization and stabilization for the development of a democracy in accordance with Chinese traditions based upon a literate mass, she turns to Soviet Russia with a Russian improvised slogan and demands "Hands off China." For six years Soviet Russia has used China as the spring board of the world revolution. If Soviet Russia persists in this rôle, there can be no hope for peace in China.

Chinese in the Philippines and Siam

Verne Dyson, professor of history in the University of the Philippines, has unearthed ancient Chinese records which indicate that the Philippines were under Chinese sway more than 500 years before Magellan "discovered" them in 1591. Mr. Dyson went to Canton searching for evidence in the old Chinese records of the early relations between the ancient empire and the Islands and found that the earliest date showing communication between China and the Islands is 982 A.D. In addition, there are records that the Islands sent tribute to China long before the appearance of Magellan and that during the early Ming Dynasty, beginning about 1405 A.D. several of the larger islands were ruled by Chinese officials, mostly from Canton.

Well, those enterprising old Fukien pirates invaded and captured Formosa and held it as an appanage to the Foochow viceroyalty up to 1896, so it is quite certain that the same fighting breed must have sailed across the Babuyan Strait and occupied considerable portions of what is now known as the Philippine Archipelago long before the celebrated Spanish *conquistador* hoisted the flag of Castile and Leon over the islands. Had Magellan overlooked these Far Away Isles of the Southern Summer Seas they most certainly would have been ruled over by a governor appointed from China or a native cacique or sultan of sorts paying tribute to Peking through either the Liangkwang or the Minche Viceroy.

History has an uncanny way of repeating itself. The Stars and Stripes now float over Malacanan Palace, but the Philippines to-day are for all practical purposes an economic dependency of Canton. When, if ever, the American flag is hauled down and the immigration bars are lowered, the Cantonese will swarm in and in due course will again govern the islands. Only the power of the United States behind its Asiatic exclusion laws has preserved the Philippines from being overrun by Chinese these last three decades. An independent Filipino Republic will change all this. That is, if it hopes to enter into friendly treaty and trade relations with its great Asiatic neighbor, it will have to wipe off its present exclusion laws from its statute books. This would be the only way, it could hope to receive recognition from China or Japan. On the other hand, it may elect to follow the precedent of Siam and decline to have any official intercourse with China.

It is only necessary to take a look at Siam to understand what will happen in the Philippines when the bars which now keep the Chinese out are lowered. There are nearly half a million Chinese domiciled in Siam. They control the rice and saw mills and many other important industrial plants. The wealth and commercial power of the Chinese community is so great that the King of Siam has rejected all overtures to enter into treaty relations with his big northern neighbor. Foreign diplomats who have seen service in Bangkok, express the opinion that the prinicipal reason for this reluctance on the part of the King of Siam to enter into treaty relations with China is due to a fear that a Chinese Minister would automatically become the most important personage in the country and in any diplomatic dispute would be able to exert a powerful economic pressure to support the Chinese case. When it is remembered that the 100,000 Chinese in the Philippines, controlling the retail trade of the Islands, carried their protest against the book keeping laws of the Internal Revenue Department, by simply closing their shops for a week, this fear on the part of the King of Siam is not altogether unwarranted.

The Shanghai Overseas Association of Shanghai has recently urged the Ministry of Foreign Affairs to request the Siamese Government to negotiate a treaty of amity and commerce and open Chinese consulates in Siam for the protection of Chinese resident in the country, alleging that owing to the absence of a formal treaty between the two countries, Chinese in Siam have been subjected to much discriminatory treatment, adding that unjustifiable restrictions are being imposed upon the immigration of Chinese into Siam while Chinese children are compelled to study the Siamese language. It is noteworthy that the protest does not emanate from the Chinese in Siam, but from an organization in Shanghai.

Siam to date has managed to evade any serious clash with China due to the absence of treaty relations which would give the Chinese Minister or consuls an opportunity to meddle in its affairs. Under this system of non-treaty relations, the Chinese have swarmed into the country and now monopolize its two major industries, represented by the saw-mills and rice-mills which line the banks of the Menam River at Bangkok. The Chinese have prospered and grown immensely wealthy and on the whole have fared better in Siam than in any other South Seas territory. Siam is also an economic colony of Kwangtung. The King of Siam rules the country but its wealth is controlled by aliens. Whether the negotiation of a treaty and the arrival of Chinese consular officials into the little kingdom would improve the condition of Chinese residents is open to question. Undoubtedly, it would enhance the prestige of the Nationalist Government, who sooner of later will press for compliance with a request of this nature.

Trans-Pacific Wireless Telephony

CONSIDERABLE publicity has appeared in recent months about the early establishment of radio-telephony between the United States and Asia. San Francisco newspapers report that the Bell System has perfected plans and definitely decided to establish circuits that will serve Hawaii, Philippines, Australia and the Far East. The first maps of the new system show San Francisco as the Western American terminal for circuits proposed by the A. T. & T. to Tokyo, a distance of 4,472 miles; Manila, 6,047 miles; Honolulu, 2,079 miles and Sydney, 6,272 miles.

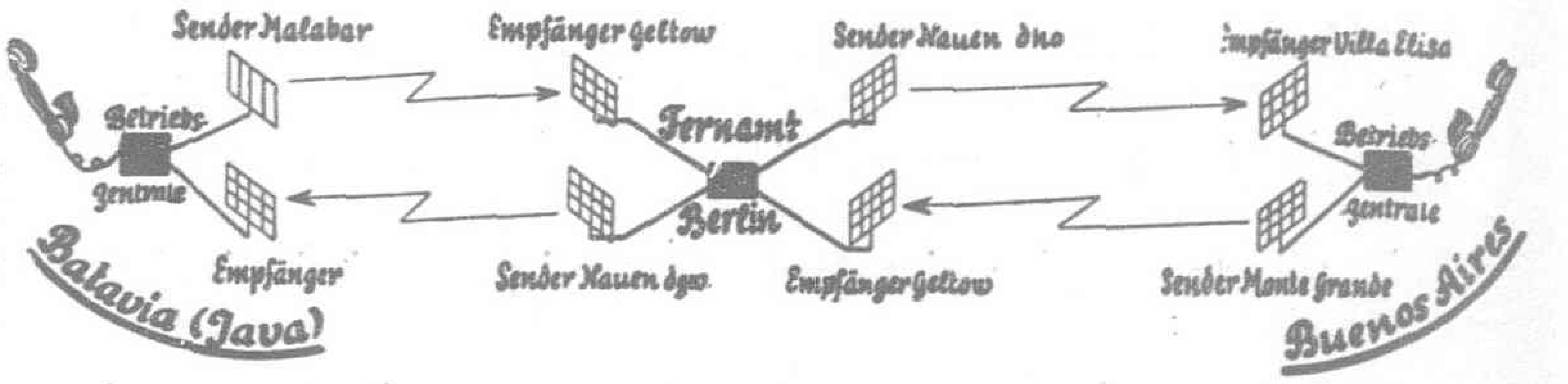
On the other hand, reports from New York would indicate that although the above circuits will be established at an early date, the outlook for radio-telephone communication with China is not so promising. Experts point out that there is only a maximum of around 15,000 subscribers in Shanghai who conceivably might have some use for the service at present, a rather exaggerated estimate.

The cost of building, operating and maintaining radio telephone transmitting and receiving stations for the exclusive use of a limited number of telephone users would make it necessary to charge heavily for each minute's conversation. A few years hence, when the proposed Pacific telephone network has taken in the most important island and mainland points on all shores of the ocean, a Shanghai connection may be created by some communications company. In the meanwhile, reports of active rivalry between A. T. & T. and R. C. A. for a "radio telephone concession" in China are considered highly imaginary.

This would seem to rule out Shanghai from the advantages of this service for some years to come.

Wireless Telephony over 23,000 kilometres Batavia to Buenos Aires via Berlin

The expansion of the net-work of wireless telephony is increasing rapidly. Now that the 12,000 kilometres distance from Berlin-Buenos Aires has successfully been bridged so that this service is now open to the public, a trial has been made with telephone connections over *double* the distance. These trials were completely successful and Batavia spoke to Buenos Aires and Rio de Janeiro *via* Berlin, in several different languages. This successful experiment was carried out by the Trans-Radio Company together with the German Post Office with the Telefunken short-wave transmitters and in the presence of Graf Arco.



Berlin operated in this case as automatic exchange office *i.e.* the conversation received at the station Geltow near Berlin from Java was directed unchanged to the transmitter in Nauen and so to Buenos Aires. The procedure is exactly the same for the participants as in the case of an ordinary trunk-call. Technically, however, and especially from the point of view of organization, this conversation represents the "acme" of accuracy and efficiency as regards both receiving and transmitting stations.

In any case, this bridging of half the globe by means of the wireless telephone and the relaying stations in Berlin demands quite a different class of transmission and reception as regards quality and reliability, as the attempt, for instance, made recently in Genoa to light a series of lamps in Sydney by means of Morse signals relayed by a station in England. From a technical viewpoint, the latter attempt certainly disappears into the back-ground when compared with this latest practical wonder-achievement of wireless telephony.

An Episode in American-Japanese Relations—II.

The Manchurian Freight Rate Controversy 1914-1916

By PAUL H. CLYDE, Ohio State University

THE lapsing interest in the negotiations was short-lived. The November despatch of Ambassador Guthrie, referred to above, brought forth almost immediately instructions from the State Department that the alleged discrimination was to be made the subject of a vigorous protest. These instructions were sent on January 25, 1916, by Robert Lansing, then Secretary of State. (28)

Mr. Lansing was impressed with the fact that: the question at issue is obscured by any discussion of forms of contract between the Railway Administration and shipping companies. The very existence of such contracts granting reduced rates is the sort of thing to which objection has been made and it is unfortunate that our Consul at Dalny allowed himself to admit the need of any such agreement as he appears to have done in his letter to Baron Nakamura dated May 5, 1915........

Still more objectionable is his letter of May 19, 1915, to Mr. Kubo. It would have been better, had he taken the position which he defined in his despatch of June 16 to your Embassy wherein he very pertinently observes:

"There is discrimination, whatever the means by which American goods arrive—whatever the nationality of the vessel—if Japanese goods are granted cheaper rates. The importing vessel is simply a subterfuge which does not affect the fact of discrimination one way or another."

You are instructed to bring the matter once more to the attention of the Foreign Office and point out that, in view of their Government, the right of American goods to receive the reduced rates can not be made to depend upon the route of shipment, the nationality of the importing vessel nor upon the signature by shipping companies of a contract with the railway, granting preferential rates.

Ambassador Guthrie replied to the Department on March 3, 1916, that:

While the Imperial (Japanese) Government appears to be willing to concede the rebate to all goods shipped directly through Newchwang to points north of Mukden, its purpose seems to be to prevent goods which have been consigned to Newchwang and there delivered to the consignee, from thereafter being forwarded to points beyond Mukden, and claiming and receiving the reduction of 30 per cent. allowed on goods shipped directly through to the ultimate point of destination.

---

(28) United States *Foreign Relations*, 1916, 446-447.

As I have heretofore reported....in my conversation with Baron Kato, former Minister for Foreign Affairs, he was very positive on two points:

First, that equality of treatment does not require the South Manchuria Railway Company to allow the same discount on goods shipped to points south of Mukden as on goods shipped to points north of Mukden;

Second, that because a discount was allowed on Japanese goods shipped from Japan direct through Newchwang to points north of Mukden, the railway company was not required to allow a similar discount on goods shipped to consignees in Newchwang who received the goods, put them in their store houses, and subsequently forwarded them by rail to purchasers at points north of Mukden.

The second point is the one which has given me trouble and I desire the views of the Department on it. The present Foreign Minister, Baron Ishii, has not yet referred to this, but I anticipate that he will do so now that the discussion has been brought back to the specific question of the discrimination complained of, and will wish to know whether I have any suggestion to make by which goods coming by tramp ships can be consigned direct from point of shipment to points north of Mukden. (29)

Again instructions were sent to Ambassador Guthrie (April 20) pointing out that he had misunderstood the Department's previous instructions.

That instruction related not alone to the shipment of goods through Newchwang to points north of Mukden but to the whole subject of reduced rates granted upon conditions with which American merchants cannot comply. The objection applies equally to goods shipped through Newchwang, Dairen or other Manchurian ports.

As to Guthrie's request for instructions should he be asked for suggestions by Baron Ishii.

The Department does not feel bound to make any suggestion in regard to this matter.

If reductions in the rates for through shipments from places outside Manchuria cannot be made without in effect becoming preferential for Japanese goods, as seems, generally speaking, to be the case, then such reductions ought not to be made or should be limited to shipments over the South Manchuria Railway of goods already imported into Manchuria. (30)

At this point the whole correspondence between the two governments came to an end and there is no record in Washington to show that any further exchanges took place at this time. Japan had conceded everything that could be expected of her and there was little practical value in pursuing the argument further. The controversy was, however, highly instructive with respect to some phases of the commercial policy of the United States and Japan in Manchuria. But before attempting to review these various points it will be well to have in mind some of the factors, for which Japan can in no way be held responsible, factors which, at this time were discriminating against American commerce in Far Eastern waters.

During January, 1915, Ambassador Guthrie prepared an extended statement on American commerce in the Far East. (31) This statement has a direct bearing on the heated correspondence which was being exchanged between the two governments relative to discriminatory freight rates in Manchuria.

The ambassador assumed the rôle of instructor to American exporters, advising them that their first obligation was to enable the consumer to obtain American goods. The shortest and cheapest route from New York to Manchuria, he continued, was by way of Kobe to Dairen, Antung and Newchwang. Furthermore, American shippers by substituting the Panama for the Suez route would be forced to substitute Kobe for Shanghai as the port of transshipment and he added: "*it must be done sooner or later, and it might as well be done before the trade is lost.*" (32)

The ambassador proceeded to point out the superior advantages of the Japanese as against the Chinese port:

The larger ocean going steamers must anchor three to 10 miles from Shanghai, in the mouth of the Yangtze River, and the cargo must be lightered to the docks, a charge upon the goods not to be disregarded. At Kobe the anchorages in the harbor are only a few hundred yards from the wharves, and with the completion of the harbor works now under construction, the largest ocean liners will be able to load and unload against the quay.

As Shanghai is about 11,085 miles from New York *via* Panama and 12,280 *via* Suez, a difference of about 1,195 miles in favor of Panama, which has also the advantage of cheaper insurance and coal, the traffic between these two ports will also, it is natural to suppose, be diverted to the newly opened route. The regular steamship service between New York and Shanghai will in practically all cases include calls at Japan. Under the circumstances, to forward goods destined for the Manchurian market in general cargo consigned to Shanghai, and to reship from that port to Newchwang instead of transshipping at Kobe, would mean an unnecessary increase over the nearest route to Newchwang by about 500 miles and to Dairen by about 480 miles, and the subjection of the goods to lighterage charge at the Yangtze port, not to mention other expenses incident to such a roundabout course.

Continuing his report, Ambassador Guthrie dealt with the relative merits of Dairen and Newchwang as ports of entry to South Manchuria. The latter was one of the ports opened to foreign trade following the notorious Arrow War. It had enjoyed some prosperity due to British trade and later some Americans had entered the field. After 1898 its position was threatened by the advent of the Russians in Manchuria, who, under the policy outlined by Count Witte proposed to create the port of Dalny, which in turn became Dairen when Japan took over the Russian concessions in Manchuria following the Russo-Japanese War. Japan proceeded to develop Dairen, and in this was so successful that the days of Newchwang, as a port of much consequence, were numbered. But neither British nor American shippers appeared anxious to move to the more modern Japanese city. This conflict between Japanese shippers in Dairen and the British and Americans at Newchwang came to a head first in the freight rate disputes with have been outlined in previous pages.

Returning therefore to the commercial report of Ambassador Guthrie, we find the merits of this conflict of interests dealt with in the following language:

Mukden, the capital of Manchuria, may be reached from Kobe by way of Newchwang, Dairen, or Antung. As between Dairen and Newchwang, there is no room for discussion. Dairen is about 845 miles distant, while Newchwang is 1,010. The service also to the nearer port is more direct, regular; and frequent than to the farther. Dairen has an excellent harbor open to shipping throughout the year, while Newchwang is situated on a river difficult of navigation and closed by ice during the winter months....By shipping from this port (Dairen) to the interior, American trade will share the facilities that Japan is providing for its own commercial development in Manchuria.

Then more specifically with respect to goods and methods of marketing the Ambassador continued:

The staple articles of American trade in Manchuria are cotton piece goods, petroleum and flour. Shippers of flour and oil from the Pacific Coast have already abandoned Shanghai for their North China trade, shipping the goods to their own agencies through Kobe and Dairen or Antung....The imports of American oil through Dairen are reported to have nearly doubled in 1913 in comparison with the preceding year....

American flour in Manchuria is handled almost entirely by Japanese merchants, there being no competitor from Japan for this article. The flour is carried from the Pacific Coast ports of the United States to Kobe, at which it is transshipped direct to Dairen....

There follows the most significant paragraphs from Ambassador Guthrie's report, paragraphs which throw a new light on the instructions from the State Department with regard to the Manchurian freight rates:

The center of distribution for American piece goods in Manchuria is Shanghai, about 535 miles by sea from the nearest port of entry, Dairen, and about 720 miles from the port most used, Newchwang. It is scarcely necessary to say that at this distance American merchants are out of touch with the market, and must depend upon second-hand information for guaging their trade.

---

(29) United States *Foreign Relations*, 1916, 448-449.

(30) United States *Foreign Relations*, 1916, 450.

(31) United States *Commerce Reports*, March 10, 1915.

(32) The italics are those of the author.

American goods in Manchuria are handled by Chinese middlemen, who, while entirely reliable, are not as up to date as their Japanese rivals. Moreover, their basis of supplies being so distant they must order their stocks forward, and contract for considerable quantities at a time—far more than most dealers are able to handle. This fact alone deprives American goods of numerous native sellers especially in the interior. Again, many who can keep stocks of American goods, hesitate to do so, because it involves financial risks, During the long interval between order and delivery, the market may change, the time required for filling a contract being from two to three months, as against two to three weeks in the case of Japanese goods. Secondly, the rate of exchange between gold currency, with which the middleman pays, and silver for which he sells, is constantly fluctuating, and sell at a loss.

Mukden constitutes the natural center of distribution for the greater part of Manchuria, and for American merchants the most advantageous one, especially because suitable sites for offices and warehouses are easily obtainable....

If American firms do not follow the example of their competitors, the United Kingdom and Japan will monopolize the Manchurian market.(33)

The foregoing pages have presented in some detail the narrative of the Manchurian freight rate controversy, and it now remains to evaluate critically the attitude of the two governments toward this alleged challenge to the open door doctrine.

The charge that Japan was discriminating unfairly in favor of Japanese goods was first raised by Consul Hanson in June 1914. Mr. Hanson claimed that if the South Manchuria Railway granted reduced rates on through shipments from or *via* Japan to the interior of Manchuria, but refused the same reduction on similar shipment from or *via* Shanghai, there was a clear case of discrimination, because "the policy of the 'open door in Manchuria', if it means anything, surely means that trade in Manchuria should be subject to legitimate competition...." So far as Dairen was concerned Mr. Hanson's argument was presented to the State Department purely "as a matter of principle" since an American cotton goods trade through that port was non-existent. But there was some American trade at Newchwang which would be bound to suffer. The case presented by Consul Hanson was thus based on the principle of legitimate competition, an extraordinary difficult principle to define and one on which nations are quite as likely to differ as individuals. The consul also had his own peculiar definition of the open door, one which it would be very difficult to construct out of the open door memorandum and notes of Rockhill and Hay respectively, written in 1899.(34)

Later in June, 1914, Dr. Reinsch, the American minister in Peking, admitted that there appeared to be in the Japanese action no violation in a literal sense of the assurances given by Japan to Hay in 1899 but there did appear to be a violation in spirit. This was an unusually thoughtful view for Dr. Reinsch who was soon to become a foremost exponent of a broad open door regardless of the qualifications that Hay placed upon the policy.

In July, 1914, Ambassador Guthrie was supporting in a wholehearted manner the views of Consul Hanson, but as we have already seen, six months later was to change completely and advocate, on the basis of sound economic principles, the diverting of American through shipments from Shanghai to Kobe. In the light of the Ambassador's report of January, 1915, there can be little doubt that his support of Consul Hanson earlier in the discussions was a snap judgment which he was forced to abandon as his knowledge grew of the uneconomical course that American shippers were following.

By July 20, 1914, Baron Kato had given assurance that in the case of goods from foreign countries in through shipment to Mukden and points north the reduced rates would be allowed whether shipped through Japan or by other routes. Whether this concession would have proved satisfactory to the United States, is a matter of conjecture. At all events the argument was immediately revived in October when it was learned that in order to enjoy the reduced rates the goods must be shipped in Japanese bottoms. This was indeed a clear case of discrimination. It was not a direct violation of the Hay doctrine of 1899, but there is reason to believe that it violated rights of the United States under Article VIII of the American-Japanese treaty of 1911. It was virtually a subsidy to Japanese shipping lines, and in spirit if not in the literal sense it did encroach upon the pledge given by Japan in 1899.

The policy of the American government as expressed to Ambassador Guthrie in the instructions of November, 1914, contained elements both of strength and of weakness. The protest was based on the clause of the Hay note of 1899 which prohibited discriminatory railroad charges. If Japan replied that non-Japanese goods had only to comply with the conditions mentioned to receive the same rates, it was to be pointed out that to require shipment over one or other of two Japanese lines was not in harmony with the first paragraph of Secretary Hay's note to Minister Buck which insured equality of treatment for navigation as well as trade in China. Although it may be questioned whether the powers in accepting Hay's three stipulations also gave assent to the full implications in the preambles of the notes, the presumption is that they did so in all cases where to have done otherwise would have nullified any one of the three pledges contained in the note. Since the third stipulation of the Hay notes sought to prohibit railroad charges and harbor dues, it seems that there was justifiable grounds for this American protest. Undoubtedly the spirit if not the letter of the Hay doctrine was in danger of violation. The American contention that the Root-Takahira notes of 1908 also provided grounds for protest was sound enough in principle, but it loses much of its force when it is recalled that Mr. Lansing had already stated that the notes did not create a legal status to which either power might appeal.

By January, 1915, the Japanese had accorded the reduced rates to through shipments irrespective of the nationality of the vessel, provided special arrangements were made by the shipping company in question with the South Manchuria Railway. Thus Japan had accepted two stipulations of the American protest: (1) that the route of shipment and (2) the nationality of the carrying vessel could not be made the basis of discriminatory rates. Only the second of these points touched the Hay doctrine, and it can only be held to have been a rather intangible violation in spirit.

Here the whole question might well have been allowed to rest, but Ambassador Guthrie was instructed to continue the debate on the ground that Japan was favoring Dairen as against Newchwang. Japan again conceded that through bills would be granted to any shipping lines.

Had the matter been dropped at this point the case of the American State Department would have rested on solid ground; but Secretary Bryan decided to continue the tiresome correspondence and in so doing based his further instructions on data which are remarkable because of marked inaccuracies. Japan it is true caused some delay in drawing up the forms for the through contracts. Mr. Bryan used this occasion to state that no line of Japanese steamers was engaged in carrying goods to Newchwang, and the American Chargé, Post Wheeler, in Tokyo, was forced to correct the Secretary by stating that latest customs reports, which were those for 1913, showed more clearances and entries of Japanese vessels than for any other nationality.

By November, 1915, the Japanese were thoroughly tired of the whole laborious discussion and saw no reason to continue it, as they had made every reasonable concession. Furthermore there were no American shipping firms who wished to enter into agreements with the Japanese at the time, for not a single American company was using the port of Dairen, nor was one likely to in the immediate future in view of the uncertain effects upon the American merchant marine occasioned by the Seamen's Laws, recently passed by Congress. But none of these factors prevented

---

(33) The facts as set forth in Ambassador Guthrie's report are substantiated in reports of various American consuls in the Far East. The report of Vice-Consul G. F. Bickford at Antung, dated July 24, 1914, and published in the *Daily Consular and Trade Reports*, December 24, 1914, No. 301, called attention to the following facts: (1) that there had been a great increase in the imports of Japanese piece goods into Manchuria; (2) imports of American cotton goods had been steadily declining for several years, their place being taken by Japanese goods; (3) imports of cotton piece goods from foreign countries of origin in July and August 1914 were—

United States..	$10,270	$ 5,854
United Kingdom	21,471	20,136
Japan	228,902	299,662

(4) the Chinese would not pay 20, 30 or 40% more for American cottons than was demanded by other producers; (5) to secure the trade in cotton goods, flour or any American manufactured product, it would be necessary to have personal representatives in the territory; (6) it would certainly not be advisable to push American cotton goods in competition with Japanese unless Americans were willing to expend as much money and energy as the Japanese were expending: (7) that "*there seems to be no reason why American exporters should not avail themselves of it* (the reduced through rates offered from Japan) *by shipping via Japan*:" (8) American trade lacked proper credit facilities at Antung. (The italics are those of the author).

(34) See United States *Foreign Relations*, 1899.

Mr. Lansing from sending further vigorous instructions to our representative in Tokyo in January 1916. Mr. Lansing was emphatic in stating that the right of American goods to receive the reduced rates could not be made to depend upon the route of shipment, the nationality of the importing vessel, nor upon the signature by shipping companies of a contract with the South Manchuria Railway. Here was certainly a case of much ado about nothing. The first two points mentioned by Mr. Lansing had been conceded by the Japanese, the third they were not willing to concede for obvious reasons that were clearly stated by the foreign minister. Here the correspondence ended ; for what reason the writer is unable to say, unless it be that Mr. Lansing somehow realized that his seemingly arbitrary attitude was not adding to his reputation as a statesman or diplomat. Perhaps he had by this time read Ambassador Guthrie's detailed report on the unsound, uneconomic practices of American shippers in using Shanghai and Newchwang as against Kobe and Dairen. But this is mere speculation.

After both sides had worn themselves out there did remain conclusions by which each nation might profit if it saw fit to do so.

(1) Japan did concede that to grant special rates on the basis of route of shipment and nationality of the vessel provided just grounds for a charge of unfair discrimination.

(2) Both Japan and the United States were forced to recognize technical difficulties in the application of the Hay open door doctrine.

(3) The trade of the United States in 1914-16 (as Minister Rockhill had stated a decade earlier in 1906) was suffering not primarily because of unfair Japanese competition, but because Americans had little interest in their market, because their goods were handled by Chinese agents who purchased their stocks at great disadvantage and frequently at higher prices, because the American routes of shipment were longer and thus uneconomical and finally because many American shippers (like their British cousins) clung tenaciously to the old Chinese port of Newchwang, while the Japanese took advantage of the new facilities at Dairen, which they were soon to make the greatest commercial metropolis of all north China.

China as a Machine Market

[The following article by Mr. Fred H. Colvin, the Editor of The American Machinist is of special interest to China engineering firms because of his expert analysis of the market for machine tools in this country and for his conclusions on present political tendencies.]

METAL working in China has not yet reached the stage where it offers much encouragement as a market for machine tools and similar equipment, despite the fact that some are sold and that the manufacturers find it difficult to see why the market cannot be appreciably increased. In a few cities, such as Shanghai and Hongkong, where considerable business is done by foreign concerns, there are dealers in machinery of various kinds who display lathes, shapers, and the like on their sales floors. Many of these are crude in design and workmanship, some of the cheaper German makes being fairly prominent.

Repair and maintenance of machinery used in the textile mills and similar industries require machine tools, and as these are frequently controlled by foreigners, the machine equipment usually reflects their own nationality. Ship repairs also require considerable machine equipment, usually of a fairly heavy type, and as many repair shops are run by Europeans, it is but natural that machines of the same nationality should be found in those shops.

In addition to these, however, there are some native shops engaged in the manufacture of electric equipment, such as small motors, electric fans, and the like. Textile machinery is also made to some extent, but the work can hardly be called manufacturing as we know it. Price is said to be a great determining factor in the purchase of machinery by native shop owners or managers. It is also said that they fight shy of buying machinery that has been used by someone else—and this in spite of the fact that many used machines that have outlived their usefulness in shops where production is far more of an item than in China, would prove a real economy. Good used machinery would frequently serve their purpose better than the cheaper grades of new machinery which they buy in preference. But it evidently requires a change of thought in the Oriental mind to make them realize that used machines might be good investments. When it comes to automobiles, however, it is said that many used, and sometimes badly used, cars find a ready market.

Small native shops employ very little machinery. Stoves for heating purposes are hand made by riveting sheet iron into cylinders and attaching a top and a suitable base for the fuel. Many other articles are made in the same way. The sound of riveting and of various hand operations can be heard as one walks along almost any street in the native quarters, the workshop being in the front of the dwelling in most cases. The old bow, or fiddle drill, is still used, particularly by itinerant tinkers, but also in the small shops, and its cousin the spring pole lathe has by no means disappeared. With these methods still in vogue, and with labor working for a pittance and consequently having no purchasing power beyond a mere subsistence, the outlook for manufacturing is not alluring, and imports of machinery are not large.

With the increased use of motor vehicles there must be a demand for service stations and for the machinery which they use. But the limited miles of roads on which motor vehicles can run and the taxes imposed at will by any town on traffic passing through hardly indicate a rapid growth of motor traffic. Ricshas abound in all the big cities. They cost about $100 each. Many of these come from Japan, complete except as to the body which is built locally. In some cases the parts are imported, bearings, spokes, and rims coming from Germany or Japan, while tires are either British or Japanese.

It is quite possible that shop conditions in China may eventually change in such a way as to increase greatly the demand for machinery because of the new factory laws recently promulgated. These laws are very drastic as compared to present statutes, and, if enforced, can hardly fail to make machine equipment necessary. No child under 14 may be employed, although those of 12 and over who are now at work may continue. Women and children are prohibited from dangerous work and from hard manual labor. Eight hours is set as the legal day, but a 10-hour day is permitted in special cases. Annual vacations, sick leave, wages, profit sharing, and arbitration are also included in the law. These provisions are, however, so at variance with present practice that in the absence of a strong central government there seems to be no likelihood of their being enforced immediately. This assumption is based on the utter failure to enforce the edict regarding the celebration of lunar New Year, even the government offices being closed, in some cases, contrary to the law.

The contrast between old customs and new laws will be appreciated when we learn that the average shop now works from 10 to 12 hours a day seven days a week. The only cessation is during the now illegal lunar New Year holiday when they shut down for two weeks, with pay. Many of the workers come from country districts and utilize this vacation to visit their families, while the proprietors and those who live nearby accept the opportunity to pay their respects to their ancestors' places of burial.

Railway shops need much new machine equipment. But considering their financial condition, the necessity for track maintenance, rolling stock, and ordinary up-keep which have been so sadly neglected for several years, the prospect of orders from this source is remote indeed. Some of the smaller roads have no shops of their own, and as a result, they run locomotives and cars as long as they can possibly be used before sending them to other shops where real money will be demanded for their repair.

There is no question that China will eventually become a good market for many kinds of machinery and of machine products. But those who know China best feel that it will take several generations to change the attitude of mind to the point of understanding the necessity for a strong central government, or, better yet, a genuine co-operation between two or more sectional governments. China is such a large country, with sections containing entirely

(Continued on page 489).

The Bombilation of the Billions

Incredible Mobilization of Communistic Wealth Transforming Soviet Russia into a Highly Developed Industrial State and a Super-Power amongst Military Nations

THE WRITING ON THE WALL

EDITORIAL FOREWORD: It would be difficult to grasp the full significance of our Leading Article on "The Menace from the Direction of Urga," without a fuller knowledge of the powerful forces at work behind the new Soviet program of economic and political expansion in Asia. We reproduce below extracts from Stalin's speech before the 16th Congress of the Communist Party held on June 29th of this year confining his remarks to the growth of the Soviet National economy as a whole and to the position and tempo of industry.

We are supplementing this official statement by a resume of recent industrial achievements in Russia, taken from "The Economic Review of the Soviet Union," which outlines the scope and rapid progress towards realizing the Five Year Plan. The marshalling of billions upon billions of roubles by a communistic state to carry forward its program, carries a message to China that its leaders would do well to heed before it is too late. The gigantic program may fall of its own weight, but all signs point to its ultimate success. Before this resounding mobilization of wealth, the petty patterings about Chinese construction schemes which can be realized only by foreign loans, is almost inaudible.

If, as we are told by spokesmen for Nanking, that the Nationalist Government intends to prosecute the war for unification until the whole country, including Manchuria, is brought under its rule, even if it takes years and years, China will emerge from the prolonged struggle a mere shell of a nation, so weakened and impoverished that it will take decades to regain its financial feet. Even if the process of unification by the sword is prolonged another three or five years, by that time Soviet Russia will be in an invulnerable military and economic position, in no mood to brook any opposition to its program from a nation that lies prostrate and helpless. The following articles convey a warning and a message.

The answer to Kuznetsk and Magnitogorsk, is ANSHAN. Anshan belongs to Japan. Hanyehping and the other blast furnaces in China are all financially under Japanese control and for all practical military purposes, are so out of date as to be useless. If Japan postpones indefinitely the construction of the Showa Steel Works, it leaves China completely at the mercy of Moscow. We repeat here what we said in the leading article. It behooves China to cultivate the friendship of Japan and work in harmony with her in Manchuria. If the South Manchuria Railway Company for one reason or another should decide to shelve the Showa Steel Works, where could China hope to supply herself with the steel and munitions that constitute the answer to Russia's tremendous preparations in Central Asia?

The answer is obvious. China would then have to purchase all her requirements from the Imperial Japanese Government Steel Works at Yawata, and should it be necessary to transport these munitions rapidly to a front in Eastern or Northeastern Manchuria, the Korean port of Seishin becomes the base for such operations. The Chinese have steadily opposed the extension of the Kirin-Tunhwa Railway to link up with the Korean system. Unless the construction of this essential strategic line and the Showa Steel Works are taken in hand at once, China and Japan may well have cause to rue the delay.

Recent Industrial Achievements in Soviet Russia

SINCE October 1, 1928, the beginning of the period covered by the Five-Year Plan for the economic development of the Soviet Union, great progress has been made in the construction of large industrial enterprises. Already several plants of outstanding importance have been completed and are in operation. In 1930 alone the following enterprises, among others, have started operations: the Stalingrad tractor plant, the Moscow auto assembling plant, the Leningrad electric station, the Voronezh brick factories (2), the Ivanovo, Kurovsky, Ashkhabad and Gandja textile mills, the Batum-Baku pipeline, the Rostov and Gomel agricultural machinery plants, the Kerch and Mariupol metallurigical plants, and a number of coal mines in Siberia and the Donetz.

The outstanding industrial achievement of recent months is the opening of the Stalingrad tractor plant in the Lower Volga Region. The first tractor was taken off the conveyor on June 17, 1930. The designs for the buildings were prepared by Albert Kahn Inc., the well-known Detroit architects, and 90 per cent. of the entire basic equipment was ordered in the United States. The work of construction was completed in one year, which is a record not only for the U.S.S.R. but for similar work in highly industrialized countries. The enterprise was originally planned for completion in 1931-32, but the general revision of the industrial program and the great need for tractors arising from the success of the collectivization movement caused the work to be speeded up greatly.

The full capacity of the Stalingrad plant has been set at 50,000 15—30 h.p. tractors in 1931-32, but 3,000 tractors are to be produced by October 1, 1930, while in 1930-31 the output is estimated to reach 30,000 tractors. On the basis of these estimates, 140 tractors will be turned out daily by working in two shifts, or one tractor every six minutes. The total cost of construction was 76,000,000 roubles ($38,000,000). The value of the annual output is estimated at $60,500,000 on the basis of a two-shift working day, or $90,000,000 for a three-shift day.

The plant includes an assembling shop with an area of 40,000 square meters, a foundry shop of 28,000 square meters and a forge with an area of 22,000 square meters. The tractor plant is but one of a number of industrial enterprises under construction in the city of Stalingrad, which is being entirely rebuilt on the lines of a socialist industrial city.

In view of the success of the Stalingrad plant, other tractor plants in process of construction are to be speeded up, the estimated output, originally set at 91,000 for the five-year period having been raised to the equivalent of 659,000 10 h.p. tractors. Construction of the Cheliabinsk plant in the Urals is to be started this summer and is scheduled to be completed in December, 1931; the annual output is estimated at 50,000 caterpillar type tractors of 50—60 h.p. During 1930 it is estimated that 40,000,000 roubles will be spent for construction work, on which 6,000 workers are engaged. In addition, the Putilov works in Leningrad is being still further expanded and is scheduled to produce 25,000 tractors in 1930-31 and 35,000 in 1931-32. A tractor plant in Kharkov is scheduled for completion toward the middle of 1931 and the annual output beginning 1932-33 is put at 50,000 tractors of the International type. The total cost will be 112,000,000 roubles, including housing and cultural centers, and 11,000 workers will be employed.

By far the most outstanding plant for the manufacture of general agricultural machinery is the Selmashstroy near Rostov-on-Don in the Northern Caucasus, one of the largest plants of its kind in the world. This huge plant was completed on June 15, 1930, a year and a half sooner than planned, and at a saving in cost of 2,500,000 roubles. The total cost of construction was over 70,000,000 roubles.

The buildings cover 117 hectares and comprise 35 departments of over a million cubic meters. The foundry is one of the largest in the world, extending over an area of three hectares and with an annual production capacity of 162,000 metric tons. The factory internal means of communication are 19.5 kilometers long. In the work of construction over 50,000 cars of building materials were used, 32,000 cubic meters of reinforced concrete, 27,000,000 bricks and 3,500 tons of iron structures. The annual output of the plant is estimated at 115,000,000 roubles ($59,000,000) as compared with the original estimate of 37,000,000 roubles. The production program up to October 1, 1930, comprises 50,000 peasant wagons, 25,000 horse rakes, 1,500 tractor drills; for 1930-31 the output is to include 100,000 peasant wagons, 100,000 horse rakes, 15,000 tractor drills, 6,000 attachments, 2,000 tractor disk harrows, 10,000 tractor plows, 10,000 tractor binders, 6,750 tractor mowing machines. The plant will be working full capacity in 1932-33.

The amount of materials necessary for the total annual output is put at 30,000 cars or 90 cars daily. All this material will be brought into the factory through one gate and will be expedited by electric power through the plant in one direction to be turned out as finished products through a gate in the rear of the plant. The plant has almost 3,600 machine tools and 9,300 workers.

The design and equipment are of the most modern type, and unlike many other Soviet industrial enterprises Selmashstroy was built entirely without foreign technical assistance. All construction materials were also of Soviet origin. About 45 per cent. of the necessary equipment was imported, chiefly machine tools from Europe which proved to be of very good quality, the remaining 55 per cent. being produced in domestic plants.

The plant is so constructed that it receives the maximum amount of sunlight and the latest safety devices have been installed. Sawdust and shavings are sucked up by a special contrivance, and a ventilating system ensures a constant current of fresh air throughout the plant. Restaurants and showers are provided for the workers, the majority of whom are housed in the adjacent garden city of Selmashstroy. The construction of schools, nurseries, playgrounds and other social centers has not yet been completed.

The new agricultural works in the Urals are scheduled to produce 1,000,000 roubles worth of machinery this year. Total capacity is estimated at 33,000,000 roubles.

Several large steel plants are being built and scheduled for completion within the next two or three years. Chief among these is the Magnitogorsk steel mill in the Ural Region, which is expected to start partial operations early in 1931. This plant will produce 2,500,000 tons of pig iron annually and the construction of the enterprise and of a new town to house 10,000 workers is estimated to cost $350,000,000. It will be the largest steel mill in Europe and is being constructed with the assistance of Arthur McKee and Company of Cleveland, Ohio.

Under the technical supervision of the Freyn Engineering Company of Chicago, Ill., a steel mill with an annual output of one million metric tons is being built in the Kuznetz Basin in Siberia. The total cost of construction, including that of a worker's town and regional power plant, is estimated at about $150,000,000. Operations will start in 1932.

Other metal plants under construction include the Lipetzk steel mill, to produce 1,250,000 metric tons of pig iron annually; the iron ore deposits in the region are estimated at about 30 million tons. The foundation of the electrolytic copper plant near Sverdlovsk was begun on May 25, 1930. The construction cost of the plant is set at 22 million roubles, the annual output at 100,000 tons by 1932.

The principal iron and steel mill completed in 1929 and already in operation is the Kerch plant in the Crimea. There are large iron ore deposits in this district. Kerch is the first iron and steel plant in the Soviet Union to produce Thomas steel and shapes. The plant will turn out 300 metric tons per day. The total annual output for the various departments is estimated at 300,000 tons of coke, 120,000 tons of pig iron, over 300,000 tons of steel, about 250,000 tons of shapes. Furthermore Thomas slag will be produced for the first time in the U. S. S. R. This will be ground and used as a fertilizer.

At Mariupol, in the Ukraine, the new pipe rolling mill, Kuibishev, started operations on May 1, 1930. It is the second largest plant of this type in Europe and is equipped in accordance with the latest technical achievements. The annual output will amount to 100,000 tons of seamless pipes, 8—18 inches in diameter and 24 meters long, to be used mainly for the oil industry.

The basis for the industrialization of the Soviet Union is the most extensive use of electric power throughout the country. Both the production of power and of electric apparatus is being expanded rapidly. The chief electric manufacturing works is the Electrozavod in Moscow, which produces as much as the whole Russian electrical industry did in pre-war days. The output includes transformers, low and high tension apparatus, special equipment for automobiles and tractors, lamps, lighting equipment, etc. This year 25 million incandescent electric lamps will be produced. The plant area when completed will cover 160,000 square meters, the section at present in operation covers 130,000 square meters, while the total building costs are about 60 million roubles. Over 5,000 workers are at present employed.

A new plant for the production of electrical instruments, the "Electropribor" was completed in Leningrad about two years ago. The production plan for this year will total 200,000 meters and 100,000 various electrical measuring instruments. An expansion planned will provide for an output of 1,000,000 meters and 500,000 instruments.

The Leningrad electrical machinery works, "Electrosila" are being completely reconstructed for the production of turbogenerators of 11,000 and 24,000 kilowatts for the big power plants. These generators are the largest low-speed machines to be built in Europe, with 88 revolutions per minute. The "Dynamo" plant in Moscow has also been expanded. The equipment for the electrification of the Transcaucasian railroads is being built in this plant.

Electric power in the Soviet Union is at present supplied by the twelve regional power plants constructed by the Soviet Government, with a total capacity of 506,500 kw., which was increased by 198,000 kilowatts since the revolution. Among the most important new power stations already in operation are: the Kashira regional power station in the Moscow district, with a capacity of 40,000 kilowatts, to be increased to 205,000 kilowatts in 1931; the Shatura station, 130 kilometers from Moscow, which has a capacity of 136,000 kilowatts and is the largest peat burning station in the world; the Volkhov station, the first great Soviet hydro-electric station, 120 kilometers from Leningrad, with a capacity of 58,000 kilowatts; the Balakhna station in the Volga with an estimated capacity of 86,000 kilowatts in 1930; and the Bobrikov power plant near Tula, which is only partially in operation. This plant uses lignite and its capacity by the end of 1930 is estimated at 174,000 kilowatts, which will be subsequently extended to 348,000.

The hydro-electric power plant on the Dnieper River was begun in 1927 and is scheduled to be completed in 1933. This will be the largest hydro-electric plant in the world, with a total capacity of 558,000 kilowatts. Hugh L. Cooper and Company, American engineers, are working as consultants on this plant which is estimated to cost $100,000,000. In accordance with the general tendency in the Soviet Union to construct groups of industries in connection with power plants, a large industrial combine is planned, to include steel, aluminum and chemical plants, which together with the necessary workers' housing are estimated to cost $230,000,000. A large agricultural combine on the Dnieper River will also be served with power from the Dnieprostroy.

The oil industry in the U. S. S. R. has increased its output during the past few years with great rapidity, due to the introduction of improved methods and new construction. The building by the Azneft (the Azerbaidzhan Oil Trust) of the Baku-Batum pipe line, with a total length of 862 kilometers, is one of the most important achievements since the oil fields were nationalized in 1920. It has a carrying capacity of 1,640,000 metric tons and is expected this year to carry 820,000 metric tons of oil. Another pipe line, between Grozny and Tuapse in the Caucasus, 390 miles long, was completed in 1929. The Grozneft (Grozny Oil Trust) has also constructed a railway line to connect the city of Grozny with the old and new oil regions. The Okha-Baikal pipe is scheduled to carry 14,000 tons of oil this year.

Altogether, the total capital investments for the past five years in the oil industry amount to about $500,000,000. The refining plants put into operation during the past two years and some as yet not completed comprise: a refinery at Baku, to treat 250,000 tons of mazut annually; two pipe stills for kerosene and gasoline, each to treat 350,000 tons of mazut annually; refineries at Batum, to treat 1,640,000 tons of oil annually—140,000 tons during the current year—cost $13,000,000; many cracking installations, pipe stills, a paraffin plant, etc.

During the current year in the coal industry 13 new mines, with an estimated annual output of 48 million roubles' worth of coal, will start operations, the value of their output for this year being estimated at 12 million roubles. In addition, construction work has been begun on nine new coal mines in the Donetz Basin; three new mines in the Moscow Region with a capacity of from 300,000—800,000 tons a year; three new mines in the Siberian coal region, with a total capacity of 800,000 tons a year; two in the Kizel district with capacities of 1,000,000 and 150,000 tons; two in the Cheliabinsk Region of from 150,000—250,000 tons capacity each. In Central Asia exploitation of the rich coal deposits of the Kokiangak region will soon begin, and it is expected to open up a mine with capacity of 500,000 tons. New coke ovens are being started in Rikovo, Kemerovo, Ruchenkovo, Makeevka, Kamensk and Dnepropetrovsk.

To meet the great shortage of wood working plants many old plants are being modernized and enlarged and 29 new ones, with an annual output valued at 87,000,000 roubles, are under construction and are expected to be in operation this year. This summer the newly reconstructed sawmill at Archangel, the largest in the U. S. S. R., will be in operation. Another mill will be in operation in Archangel toward the beginning of the winter with a similar capacity. The total cost of both mills is about 23,000,000 roubles. The wood-working combine at Bobruisk in White Russia is also nearing completion. This combine will cost six million roubles and is considered one of the most up-to-date plants in Europe. It will have its own power station of 3,700 kilowatts capacity. The annual capacity is estimated at 710,000 cubic meters and the production for the current year is set at 200,000 cubic meters. It is expected to employ about 2,500 workers. In November, 1929, the Dvina Veneer Wood Trust in White Russia was opened. The annual production, based on a two-shift working day, is estimated at 30,000 cubic meters of birch and other veneer.

In the textile industry the most important achievement has been the virtual rebuilding of Ivanovo-Vosnesensk, the "Russian Manchester," the center of the Soviet textile industry. When the entire new melange combine is in full working order it will be the largest textile mill in the world with 400,000 spindles and an annual output of 80 million meters of cloth. The construction of the combine was begun in May, 1928, and the first machines started work on November 7, 1929. By the end of the current year the first part of the construction work will be completed. In addition to factory buildings, comprising textile mills, a metallurgical plant and an electric station with a capacity of 14,000 kilowatts, social and cultural centers, restaurants, etc., are included in the 40 million roubles assigned for the combine. In Vitebsk, White Russia, the construction of a clothing factory was begun in the spring of 1929 and will be in operation this summer. It is planned to employ 4,000 workers operating in three shifts. A number of textile plants are being built in Transcaucasia. In 1929 a large cotton mill was completed at Leninkakan, Armenia, with 40,000 spindles, to be increased later to 100,000. There are also 2,500 looms and a knitting factory. The first large spinning and weaving mill in Azerbaidzhan will be in operation in Gandja before the end of the year. This mill will have 66,000 spindles and 2,000 looms and will employ 3,000 workers. The textile industry is expected to complete the construction of 14 mills this year, which will operate at about 50 per cent. capacity during the first year. The total annual production working at full capacity is estimated at 185,000,000 roubles.

The existing automobile plants are being remodeled on modern lines. A new assembling plant in Nizhni Novgorod operating on the Ford system has started work. The Nizhni Novgorod automobile factory to produce Ford A and AA models is scheduled for completion in 1932 and will produce 140,000 cars annually. Another automobile assembling plant was completed this year in Moscow. The Amo automobile plant in Moscow is being rebuilt and enlarged.

The outstanding achievement in the field of transport is the Turkestan-Siberian Railway, completed on May 1, 1930. This line, 1,445 kilometers in length, was constructed in three and a half years and unites the Siberian plains with the semi-tropical Central Asiatic Regions, constituting a bridge between Siberia and Turkestan. The cost of construction of this first main railway line to be built under the Soviet Government was 175 million roubles ($90,000,000).

Other plants of importance completed and under construction comprise the Gusevo glass works, which started operations in November, 1929. This is the largest glass factory in Europe and has an annual production of 400,000 cases of glass. The total cost of construction, including that of housing and power plants, was 10 million roubles ($5,000,000). At Lisichansk in the Donetz Basin the construction of a glass factory has been begun, to produce 22 million square meters annually of ordinary and better grade window glass. This plant will cost 35 million roubles and is to be equipped with seven furnaces and 80 Fourcauld machines.

One of the largest superphosphate plants in Europe has recently been completed in Konstantinovka. It is expected to produce 60,000 tons of superphosphates before the end of the year, but the total annual capacity will reach 300,000 tons. This plant will double the present output of superphosphates in the U. S. S. R.

By the end of the year the Syas plant in the Leningrad district for the production of bleached cellulose will start operations. The estimated annual output of cellulose is set at 40,000 tons.

Building materials, of which there is a considerable shortage, due to the tremendous building program under way, will be supplied by 59 new plants to produce annually 64 million roubles worth of materials. New plants have been or are being constructed for the manufacture of paper, artificial silk, boots and shoes, rubber goods, etc., besides canneries and about sixteen factories for the preparation of food products, with an estimated output for the current year of 28 million roubles.

Stalin on the Soviet Economic Situation

Extracts from a speech of Joseph Stalin, General Secretary of the Communist Party of the Soviet Union, delivered at its Sixteenth Congress on June 29, 1930.

The internal conditions of our country present a picture of continuous growth of the national economy and of progressive reduction of unemployment. Our large industries have grown and have quickened the tempo of their development. Heavy industry has gained strength, and the socialized section of industry has advanced greatly. State and collective farms have grown to be a powerful factor in agriculture. While two years ago we faced a crisis in grain production and were dependent for our grain collections primarily upon individual farms, we can now consider that the grain problem has in the main been solved. The center of gravity has been transferred to the state and collective farms, and the bulk of the peasantry has definitely turned in the direction of the collective farm. The resistance of the kulaks has been broken. The internal situation of the U. S. S. R. has become still stronger, as may be seen from the general picture of conditions at the present moment given below:

Growth of the National Economy as a Whole

A.) In 1926-27, at the time of the Fifteenth Congress of the Party, gross production of agriculture, including forestry, fishing, etc., amounted to 12,370,000,000 roubles, in terms of pre-war roubles. This is equal to 106.6 per cent. of the pre-war level. In the following year gross production was 107.2 per cent. and in 1928-29, 109.1 per cent. of pre-war. During the current year, 1929-30, judging from present conditions in agriculture, it will be no less than 113—114 per cent. of the pre-war level. We thus have a steady, even though comparatively slow growth, of production in agriculture as a whole.

In 1926-27 the gross production of industry, including flour milling, was valued at 8,641,000,000 pre-war roubles; *i.e.*, 102.5 per cent. of the pre-war level. In 1927-28 production was 122 per cent. of pre-war, in 1928-29 142.5 per cent. and in 1929-30, judging from the present progress in industrial development, it will amount to no less than 80 per cent. more than before the war. Our industry, as a whole, then, has grown unusually rapidly.

B.) In 1926-27 the freight turnover of the railroad system was 81,700,000,000 ton-kilometers, or 127 per cent. of the pre-war level. In the following year it was 134.2 per cent. of pre-war, in 1928-29, 162.4 per cent. and in the current year we shall have, according to all indications, a freight turnover at least 93 per cent. greater than that of pre-war. As regards the construction of new railroads, the total length increased from 76,000 kilometers in 1926-27 to 80,000 this year, or 36.7 per cent. above the pre-war level.

C.) If we take the total trade turnover of the country during 1926-27 (31 billion roubles) as 100 we find that in 1927-28 it amounted to 124.6 per cent. in 1928-29 to 160.4 per cent. and during the current year it will probably be 202 per cent. *i.e.*, trade will have doubled in comparison with the situation three years previously.

D.) If we consider the combined assets of all our credit institutions on October 1, 1927 (9,173,000,000 roubles) to be 100, the balance sheet a year later was 141, and on October 1, 1929, 201.1 per cent. *i.e.*, it has doubled as compared with 1927.

E.) If we take the combined federal and republican budgets for 1926-27 (6,371,000,000 roubles as 100, we see that the budget in 1927-28 had grown to 125.5 per cent. the next year to 146.7 per cent. and in 1929-30 to 12,605,000,000 roubles, or about double that of 1926-27.

F.) While our foreign trade in 1926-27 was 47.9 per cent. of the pre-war level, the following year it was 56.8 per cent. in 1928-29 67.9 per cent. and this year it will amount to no less than 80 per cent. of pre-war.

G.) As a result we have the following picture of the growth of our national income : In 1926-27 the national income, according to the data of the Gosplan, was 23,127,000,000 roubles, in 1927-28 —25,396,000,000 roubles—an annual increase of 9.8 per cent, last year 28,596,000,000 roubles—a gain of 12.6 per cent. and this year (1929-30) it will amount to no less than 34 billion roubles—a growth for the year of 20 per cent. The average annual increase during the three-year period under consideration will amount, therefore, to more than 15 per cent.

If we take into consideration that the average yearly growth in the national income in such countries as the United States, England and Germany is not more than 3—8 per cent. we shall have to concede that the tempo of growth of the national income in the U. S. S. R. is truly a record one.

Achievements in Industrialization

The growth of our national economy is not a matter of chance but proceeds in a definite direction ; namely, in the direction of industrialization, under the slogan of the growth of the rôle of industry in our national economy, under the slogan of the transformation our country from an agrarian to an industrial one.

The dynamics of the relations between industry and agriculture, from the point of view of the share of the former in the gross production of the national economy, may be seen from the following figures : Before the war industrial production comprised 42.1 per cent. of the total national economy, and agriculture 57.9 per cent. In 1927-28 industry increased to 45.2 per cent and agriculture dropped to 54.8 per cent. and in 1928-29 the figures were 48.7 and 51.3 per cent respectively. This year the share of industry will be not less than 53 per cent. and that of agriculture 47. This means that industry is already playing a more important rôle than agriculture, and that we are on the eve of the transition of our country from an agrarian to an industrial one........

The development of industry in general, however, does not present a complete picture aof the tempo of industrialization. In order to obtain this we must ascertain the relation between heavy and light industry. The best signs of the growth of industrialization are the progressive gains in the production of machinery, especially the production of the means of production (heavy industry). While in 1927-28 the share of heavy industry in the production of all industry was 27.2 per cent. and that of goods of general consumption 72.8 per cent. we see that in 1928-29 the share of the former was 28.7 per cent. and the share of articles of general consumption 71.3 per cent. The figures for 1929-30 will according to present indications, be 32.7 per cent. for heavy industry and 67.3 per cent. for light industry........

Leading Position of Socialized Industry and the Tempo of its Growth

....Of special interest are the data about the tempo of development of state industry, as planned by the Supreme Economic Council. If we take gross production of socialized industry in 1926-27 as 100, in 1927-28 it grew to 127.4 per cent. the following year to 158.6 per cent. and in 1929-30 to 209.8 per cent. This means that socialized industry, embracing all the basic and heavy industries, has in the course of three years more than doubled its output. No other country in the world can show such an extraordinary tempo of development for its large-scale industry. This fact permits us to speak of fulfilling the Five-Year Plan in four years.... In fact, in a number of industries we can carry out the Plan in three and even in two and a half years....The following facts speak for themselves.

According to the Five-Year Plan our oil industry in 1932-33 should reach an output valued at 977 million roubles. The production of the current year (1929-30), however, will amount to 809 million roubles, or 83 per cent. of the schedule for 1932-33. This means that we are carrying out the Five-Year Plan in this industry in two and a half years.

In the peat industry the value of production in the last year of the five-year period should amount to 122 million roubles ; actually, however, we shall in 1929-30 reach a level of production of more than 115 million roubles, or 96 per cent. of the planned production for 1932-33. These figures show that for peat also we are fulfilling the Five-Year Plan in two and a half years, if not sooner.

The value of the output of the general machine-building industry should in 1932-33 total 2,058,000,000 roubles. This year, however, its production will be worth 1,458,000,000 roubles ; *i.e.*, 70 per cent of the production level estimated for 1932-33. This shows we are carrying out the Five-Year Plan in the general machine-building industry in from two and a half to three years.

The value of the production of agricultural machinery planned for 1932-33 is 610 million roubles. But the output this year will already amount to 400 million roubles, or more than 60 per cent. of that estimated for the last year of the Five-Year Plan period. We are, therefore, fulfilling the Plan in this industry in three years or less.

The electro-technical industry should reach by 1932-33 an output valued at 896 million roubles, but this year its production is already worth 503 million roubles, over 56 per cent. of the plan for 1932-33. Thus in this industry we will fulfill the Five-Year Plan in three years,. Such is the extraordinary tempo of the development of our socialized industry.

Imperial Japanese Steelworks

There is a scheme under consideration to transfer the business of the Imperial Japanese Steelworks at Yawata to a private company as a means of relieving the political situation in which the present Ministry is placed. The scheme has now been considered for sometime, and for several reasons has official support.

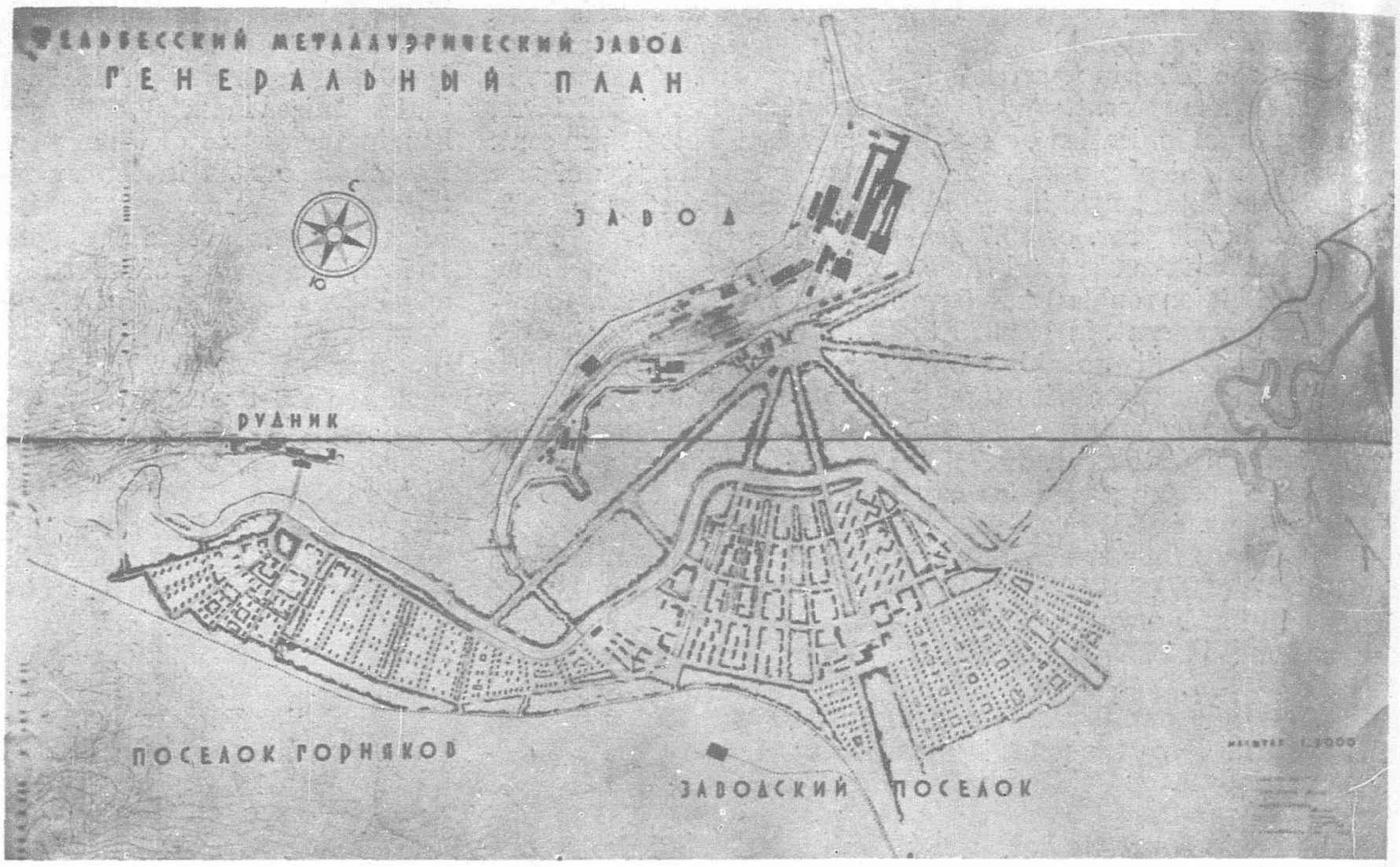
The original purpose of establishing these steelworks was to promote the development of an iron and steel industry in Japan, and to carry it on with State aid ; but as the industry may now be considered safely established, there is no longer any necessity for continuing the Yawata works as a Government undertaking.

The accounts of the steelworks were kept rigidly separate, and all profits were devoted entirely to extending and improving the works and their trade without any special benefit to the Government treasury. Consequently there is no reason or excuse for retaining the works as a source of revenue to the State.

Releasing the works from Government control would enable the undertaking to work out its own salvation and act as a guide to private enterprise in the country.

From a theoretical point of view, therefore, the proposed scheme of transfer is perfectly sound, but it is feared that carrying it out would meet with difficulties. In order to carry through the scheme a special company would have to be formed with a capital subscribed entirely by private parties or on a kind of semi-official basis like the South Manchuria Railway Company. The purchase price would be very high, as the total capital sunk in the enterprise to date amounts to about 140,000,000 yen (say £14,000,000), besides which bonds to the amount of about 25,000,000 yen (£2,500,000) in the aggregate have also been issued. To find the capital necessary to purchase the concern at this rate would overtax the private resources in the country.

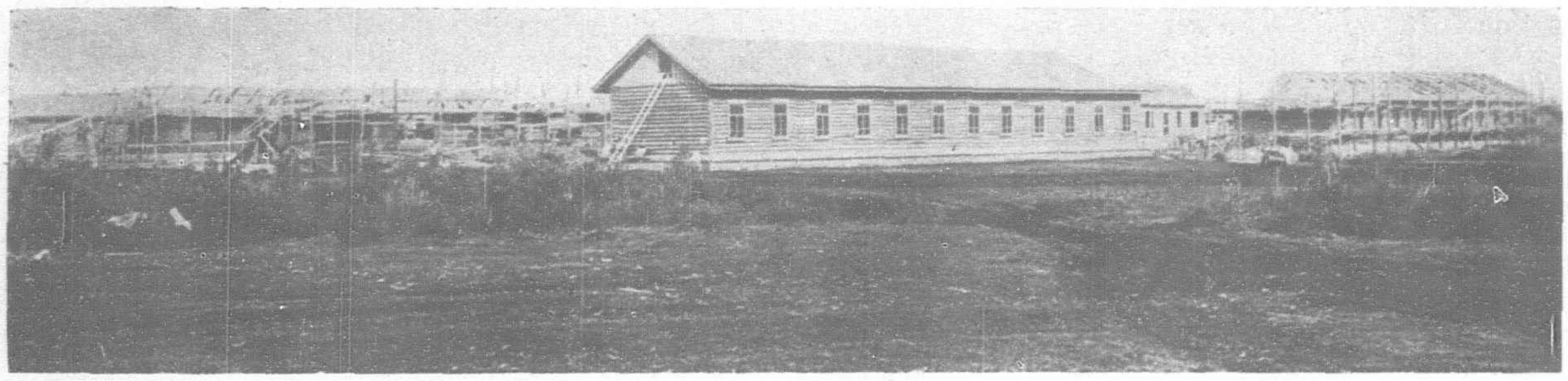
The Million Ton Kuznetsk Steel Plant in the Altais



Projected Plan of Kuznetsk Steel Works and Town

A STEEL plant, having an annual output of one million tons, is to be built at Kuznetsk, U. S. S. R. by the Freyn Engineering Company, a Chicago firm of consulting engineers. An agreement to this effect was concluded on June 4, with Novostal, the Soviet organization in charge of construction of new Russian steel plants.

Reading between the lines of the typewritten documents comprising the agreement, discloses that a large body of very earnest and discriminating people believe that American engineering ability will build them the best steel plants.



Construction Buildings Under Way at Kuznetsk, Siberia

Why American Consultants?

In the industrial history of old Russia under the Tsarist régime profits were considered more important than modernization and maintenance of the plant. Labor was cheaper than progressive reconstruction. In 1913 the Russian steel plants were as backward as in 1905. In 1930 the Soviet Union proposes to build as of 1935, and in such manner as to maintain a lead of the times instead of a lag. Necessary for the attainment of this ambitious aspiration is the assistance of engineers of pioneering impulse, sound knowledge and wide experience; and, more important, of rational vision. The embodiment of these qualifications the Soviet Union finds, after due consideration and experience, in the American engineer.

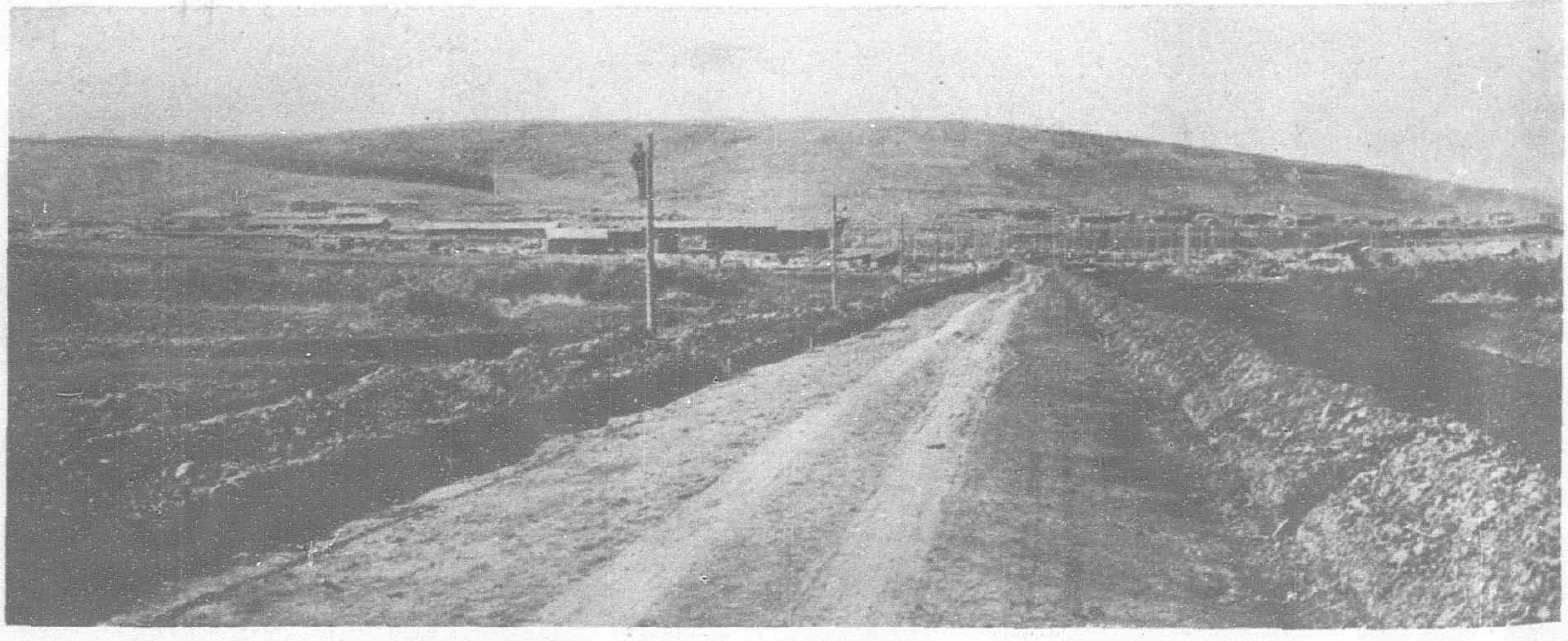
The Freyn Engineering Company has enjoyed the opportunity of professional contact with the Soviet iron and steel industry over a period of three years. During a large portion of this time, this company maintained a staff of engineers in the U.S.S.R. as consultants to Gipromez, the Soviet organization for projecting new metal works. The Freyn Engineering Company is, therefore, in an excellent position to judge of the possibilities for successfully executing a program of construction, including to maintenance of Americans and their families.

The Russians on their side have been able to appraise the value of American steel plant engineers by first-hand observation of their performance.

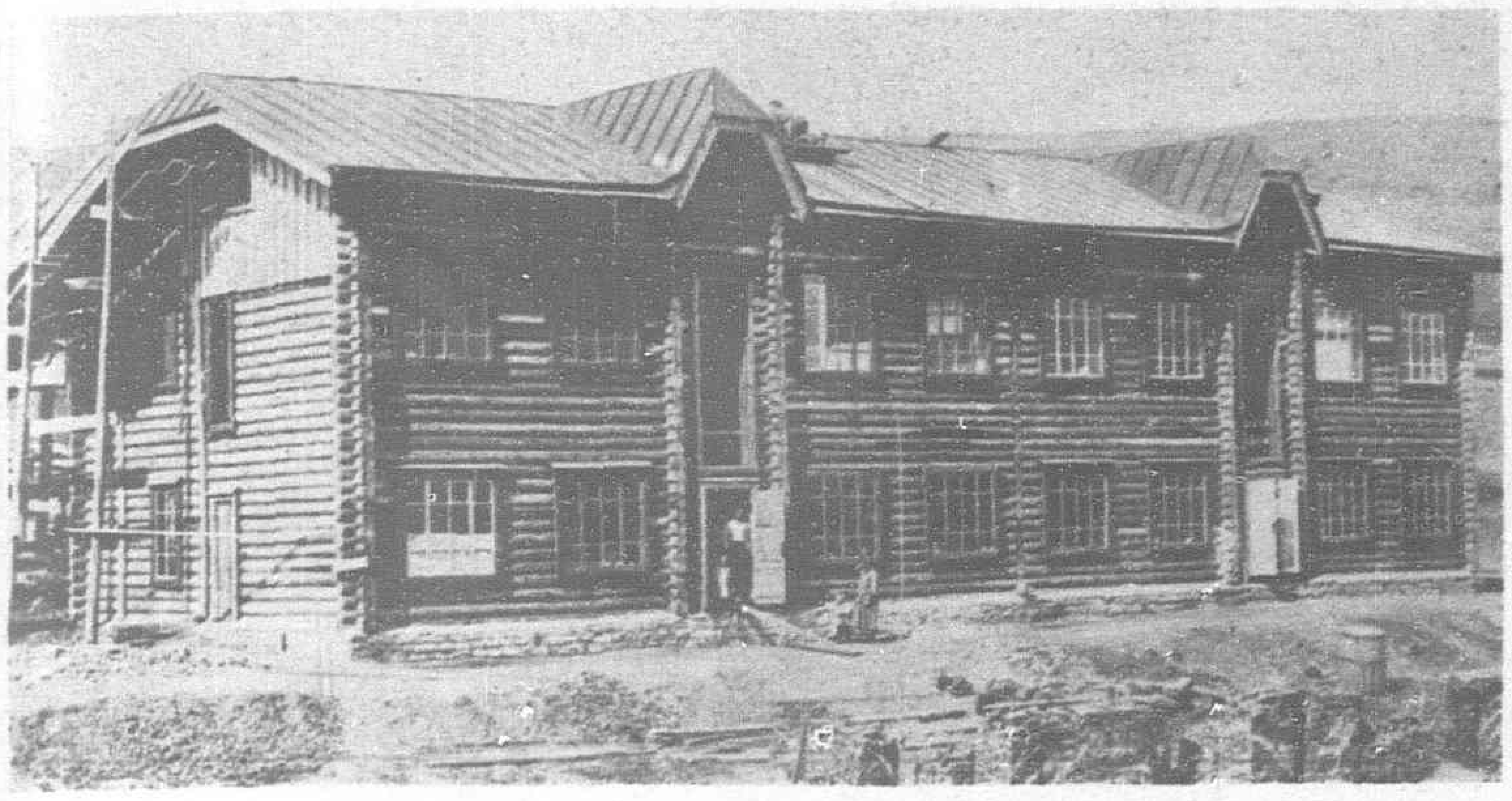
That the experience has proved mutually satisfactory, is manifested in the agreement, entrusting to this company the responsibility for the design and construction in three years of a complete steel plant, having a capacity of one million tons per year.

Four Blast Furnace Plant

Among the projects that were made by the Freyn organization under Gipromez, is the one which is now to be executed by



New Road and Telephone Line Under Construction, at Kuznetsk



Building Nearing Completion, Kuznetsk

the Freyn Engineering Company under Novostal, the Soviet organization in charge of construction of new steel works. Between fifty and sixty American engineers will constitute the organization which will direct the execution of design, specifications, fabrication, and superintend the erection and initial operation of the Kuznetsky Steel Works. The design work involved will be carried out in Leningrad, Moscow and at Kuznetsk.

There will be initially four blast furnaces, each of advanced American type, both as to lines, construction and accessories, averaging daily probably 800 tons pig iron.

The steel plant will comprise twelve 125-ton open hearth furnaces; blooming mills, rail and structural mills, continuous billet mills and plate mills. There will be four batteries of coke ovens and a power plant having a capacity of 96,000 kw., with all the auxiliaries required of a modern steel plant.

The location is on the Tom River, about 220 miles south of the city of Tomsk, Siberia. For over a year preliminary work has been done, such as building roads, clearing site, erecting dwellings, offices and temporary buildings. There are several thousand men now on the job. The illustrations provide an idea of the preparatory steps under way at Kuznetsk.

Soviets Welcome Americans

A number of Freyn engineers, with a year's background of experience in the U.S.S.R., have returned to the United States on vacation. They are unanimous in attesting to the well-being of the foreign consultant in the unusual environment, of Russia. Particularly manifest is the hospitable consideration which the Russians, individually and officially, extend to Americans.

Before 1913 Siberia helped Europe to feed its population. She still carries a heavy part of the load as regards the commissariat of some one hundred fifty million people, in spite of the recent recovery of agriculture and transportation from the demoralization of war and revolution. The terrain and climate about Kuznetsk are similar to North Dakota: Rounded glacial hills, warm summers, cold, dry winters. The region is essentially a grain territory. Forests in the vicinity represent some of the world's few remaining stands of untouched timber. There are copper, gold and coal mining operations of long standing. The Trans-Siberian Railroad crosses the north end of the Kuznetsk District, and the newly opened 1,000-mile Turk-Sib line, connecting the Trans-Siberian with the cotton and cattle raising territory of Turkestan, is adjacent on the west.

Iron ore is indicated in quantity, with iron content between 56 and 61.5 per cent. Kuznetsk coal has been worked for 30 years and furnishes a high grade of coke now used in some of the Ural mountain blast furnaces.

The Soviet Government is aggressively pushing the development of Siberia. With the development of the Kuznetsk District, the center of Russian steel production promises to move conspicuously eastward.

China as a Machine Market

(Continued from page 483).

different conditions, languages, and psychologies, that many feel it is too much to expect a real government from any one section that would be acceptable to the others.

When industrialization comes to China, as it will, a wise government, or several of them, can prevent much of the distress and unrest that has followed the rapid introduction of machinery in other old countries. China can absorb hundreds of thousands of laborers in road building, not as a charity, but as a means of adding directly to the wealth of the country. Every added mile of highway will open new possibilities of employment as well as help to eliminate the famines that now occur all too frequently and lack of roads prevent relief.

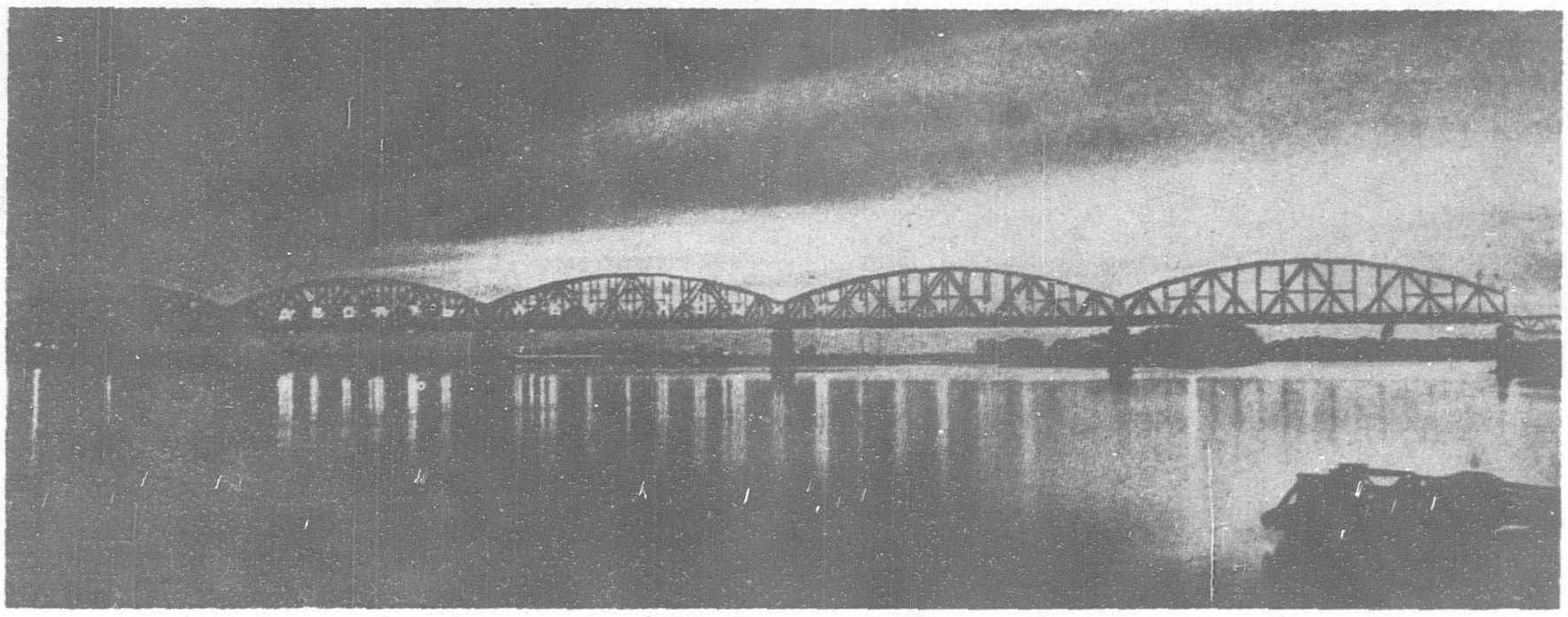
Though the present outlook for the sale of machines in China is not very bright, it does not mean that the market can be neglected with impunity if we are to share in it when it develops. There is perhaps no market in which the competition is more fierce or in which, except for discriminatory duties, there are fewer advantages for American manufacturers. China is nearly enough equidistant from the great manufacturing countries to equalize approximately the cost of transportation. British, French and German interests are already strongly established, and while American machines also find their way into China, it is unwise to rest on the laurels already won. The situation must be carefully studied and its developments noted if we are to share in the business that may develop later. The excellent work being done by our commercial attachés at various points will be of great value to all who are directly interested.

Lastly, we must not overlook the effect of the political phase on our future business. Except for the discriminatory exclusion bill, we have been on very friendly terms with China for many years. Our return of the Boxer indemnity for educational purposes was a master stroke of diplomacy. But we all forget past kindnesses in the face of a present slight or humiliation, and discrimination always rankles. The manner in which we handle the problem of extrality, and it is a real problem regardless of theoretical arguments, may have a great effect on future business. Fortunately we are splendidly represented by the new minister, and there is every likelihood that the matter will be handled with the utmost diplomacy. But Congress is very likely to view questions of this kind more from sectional, vote-getting viewpoints, than from those of national or international welfare and it behooves business men to keep tabs on their action as having a direct bearing on future business, for the new China is going to consider more than friendships of past generations and the prices of goods. Discriminatory legislation will have its effect on business when the new China gets into its stride, no matter how long its coming may be deferred.

Diesel Locomotives for the Siamese State Railways

The Siamese State Railways have ordered from Sulzer Brothers, Winterthur, six Diesel locomotives, which will be used in mixed traffic and also for shunting. Working with steam is very expensive because of the lack of coal in Siam and the necessity of firing most of the steam locomotives with wood. Some trains have to travel long distances, and in certain cases the locomotives must be changed three times. The management of the Siamese State Railways consequently investigated various methods of improving the service; complete electrification was also considered, but had to be rejected as too expensive, and Diesel locomotives were chosen for hauling the trains.

Each locomotive is equipped with a 400-b.h.p. single-acting eight-cylinder Sulzer four-cycle Diesel engine, direct coupled to a D.C. dynamo, which supplies current to four driving motors mounted in tram suspension on both the outer axles of the two six-wheeled bogies. The fuel consumption is low and the consumption of water practically nil, advantages which allow trains to be hauled over the longest runs in Siam without changing the locomotive.



New Turk-Sib Railway Bridge Over the Irtysh River

The Turkestan-Siberian Railway

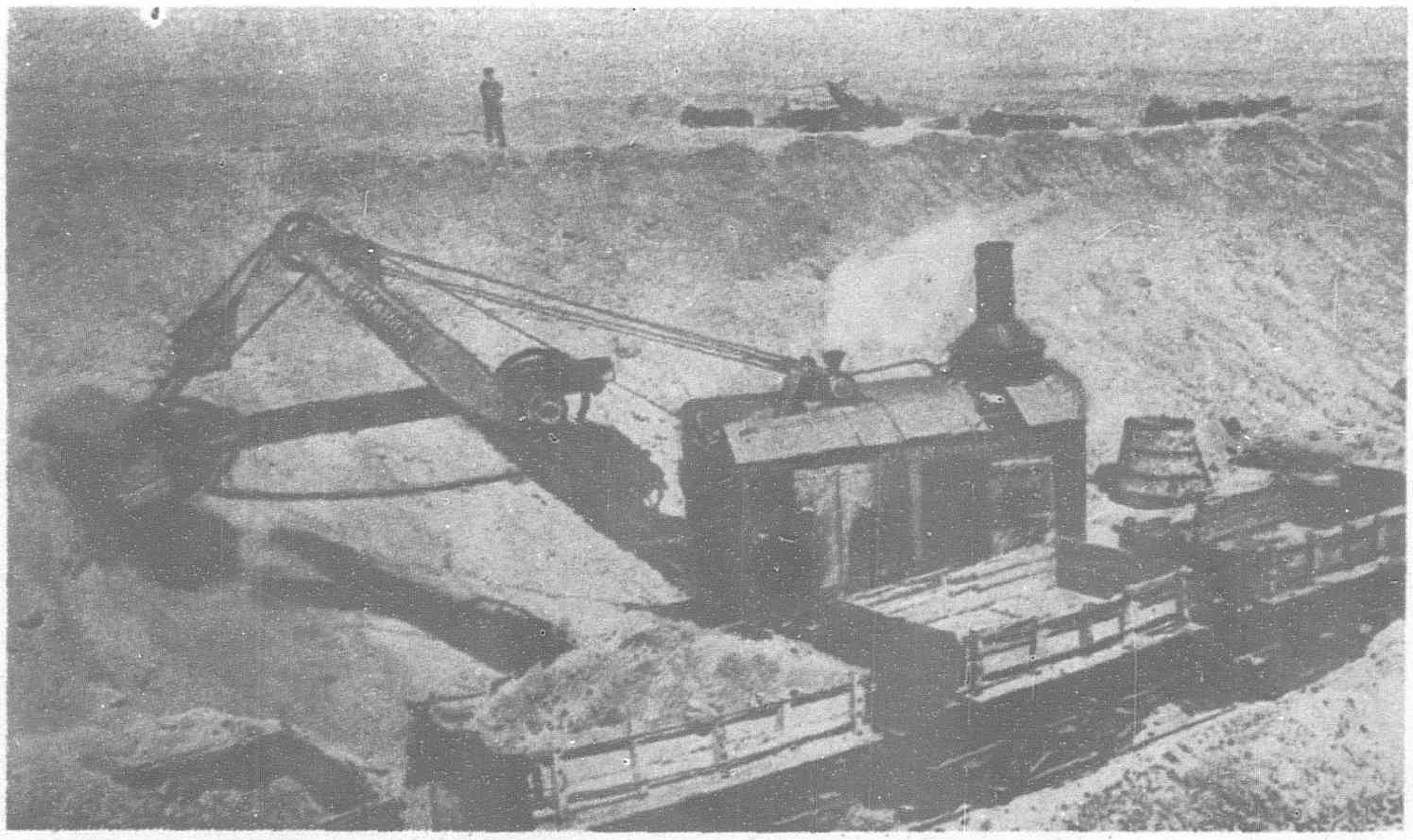
The Turkestan-Siberian Railway, "the steel backbone of Kazakstan," was completed officially on May 1. The construction of the railroad, almost a year and a half faster than was anticipated, marks one of the first great achievements of the Five-Year Plan. The project of building a railway to connect Siberia with Turkestan was by no means new. Already in 1878, and on several subsequent occasions, the question of building such a railway was raised, but it never got beyond the discussion stage until December 1926, when the Soviet Government finally decided to start this important undertaking.

The Turk-Sib (the abbreviated name of the road) unites the cold, northern Siberian plains with the semi-tropical Central Asiatic regions. It constitutes a bridge between Siberia and Turkestan and links up three of the largest regions in the Soviet Union: Siberia, Kazakstan and Central Asia. The primary economic motive in the construction of the railway was to aid the development of the cultivation of cotton in Central Asia, which will serve as the principal source of raw cotton for the textile industry of the U.S.S.R.; in turn Central Asia will be supplied with grain and lumber from Siberia. At the same time the railway will make possible the development of the rich natural resources of Kazakstan.

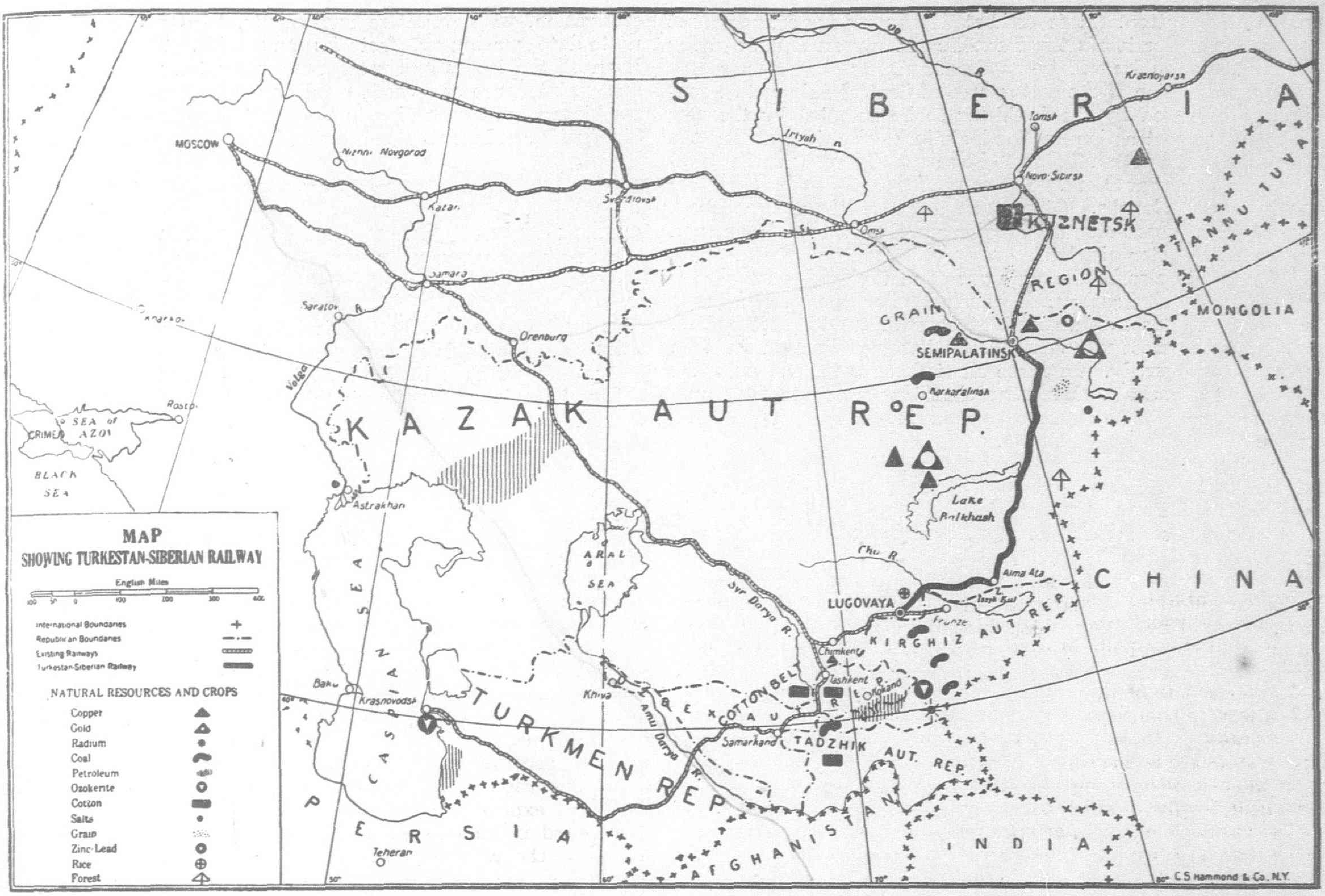
The construction of the railway was bound up with what might seem almost insurmountable difficulties. The geographical and climatic peculiarities of the country, the thinly populated territory and the remoteness from industrial centers and roads of communication, constituted the basic obstacle to be overcome. The line traverses steppes, mountain passes, rivers and simoon-swept desert plains. Kazakstan, through which territory the railway runs, has a population of only six million and covers an area of three million square kilometers, more than that of France and Germany together. The obstacle of a sparse population was accentuated by the fact that the local nomadic tribes were totally unskilled. Experienced technicians and railway workers had to be brought in from other parts of the country, who were unaccustomed to the climate and native conditions. However, considerable native labor was also utilized. All kinds of machinery, including ecormous excavators, had to be transported by primitive means, mainly by horses and camels, and to a certain extent by tractors. Serious delays were often caused in transporting materials and machinery in view of the inaccessibility of the region and the total lack of improved highways. A considerable amount of American and other foreign construction equipment, such as steam shovels, derricks, pneumatic drills, etc., was imported.

The geographical peculiarities of the territory necessitated the co-operation of the Academy of Science, which sent a special geological expedition to Central Asia in 1927. This expedition contributed invaluable service in helping to determine the exact course of the railway. The original plans were changed, since these involved crossing the high mountain range between Kirghizia and Kazaketan. The final decision arrived at was the route *via* the Chokpar Pass, which lengthened the route somewhat, but at the same time greatly reduced the cost of construction and was one of the main factors in speeding up the work. The cost of preliminary excavations and earthwork was reduced from the estimate of 41,000,000 roubles to 22,000,000 roubles, and the expenditure for bridges from 8,700,000 to 4,800,000 roubles through this revision of the route. The total cost of construction of the Turk-Sib was reduced from the estimate of 204,000,000 roubles to 175,000,000 roubles ($90,000,000), including expenditures up to May 1, 1930.

The entire line of the Turk-Sib (1,445 kilometers long) consists of 2,042 kilometers of track on the main line and 300 kilometers at the various station yards. It is reported that the rate of laying the rails was from 2½ to four kilometers per day, which compares favorably with the speed attained in other countries. Many innovations in working methods were introduced and the old time idea of seasonal work was abolished. Work was carried on all the year round, and to a certain extent also in shifts during the entire day and night. In the words of J. Rudzutak, Soviet Commissar for Transportation, "the construction of the Turk-Sib, the most Eastern achievement of all our new undertakings, is a model of up-to-date technical methods and speed. It will serve as an example for our other big construction enterprises."



American (Marlon) Excavator at Work on the Turk-Sib Railway Construction



The director of construction operations on the railway was William Shatoff, who since his return to the U.S.S.R. from the United States in 1917 has directed various important Soviet enterprises. He succeeded in infusing among the working personnel a spirit of pioneer enthusiasm and co-operation. The average number of workers engaged in the undertaking was about 50,000. These workers had to be housed, fed and clothed, in waste regions and districts devoid of the simplest daily necessaries. It was, therefore, essential to the efficient conduct of the work to endure a proper organization of food supplies, medicaments and medical assistance, and all other requisites for the well-being of the workers.

By May 1, the following volume of work was completed. Earthwork on the main line, including station work and auxiliary projects 19,368,000 cubic meters, or 88 per cent. of the entire program ; 851 structures, such as bridges, stone, concrete and reinforced concrete viaducts, with an aggregate volume of 139,000 cubic meters, or 83 per cent. of the program ; reinforced concrete structures totaling 4,831 cubic meters, or 64 per cent. of the total ; metal structures in which were used 6,867 tons of metal, or 93 per cent. of the total ; warehouse tracks and sidings with 1,570 tons of rails, or 95 per cent ; 6,367 kilometers of telegraph wire, or 73 per cent. ; railroad stations, houses and other buildings totaling 42,700 square meters of floor space, or 20 per cent. of the total ; quarters for the workers during the period of construction totaling 115,000 square meters. There is a large building program still to be carried out, involving further construction of houses, clubs, hospitals, schools and training centers, and the additional buildings connected with the railway itself, such as stations and locomotive sheds.

The Turk-Sib Railway will have great significance in opening up for exploitation the natural resources of Kazakstan and Central Asia. The volume of goods anticipated to be carried during the first year is 2,000,000 tons. For the first ten years the work of the line will consist mainly of freight shipments to supply the needs of the territory and to help develop the existing enterprises and the new undertakings planned.

The Turk-Sib extends from Semipalatinsk in Southern Siberia to Lugovaya on the Kirghiz border. But this stretch of 1,445 kilometers constituting the new railway really links up Novo-Sibirsk in the north with Tashkent in Central Asia, a total stretch of 2,258 kilometers, thereby opening up for cultivation and industrial development an area of 480,000 square miles. Going north from Lugovaya the Turk-Sib line traverses the Chu River, the Chokpar Pass, 1,200 meters above sea level, over the Trans Ily mountains to Alma-Alta, the capital of Kazakstan, and then hundreds of kilometers of waste desert lands and steppes along the banks of Lake Balkhash. At Semipalatinsk a large railroad bridge had to be constructed across the Irtysh River.

Central Asia has a semi-tropical climate and is well suited to the production of a number of valuable industrial crops, such as cotton and rice. At present the tilled area is 25 per cent. under cotton. The black earth belt of southern Siberia and a section of northern Kazakstan is in a position to supply the needs of Central Asia with grain, but owing to lack of transport facilities this was not possible before the construction of the Turk-Sib line. Through the medium of the new railway Central Asia will be supplied with wheat at less than half the former cost. Goods from Siberia entered Central Asia by a round-about (over the Orenburg-Tashkent Railway) involving an extra journey of several thousand kilometers.

An immediate extension of the area under cotton will be attained by the elimination of wheat cultivation and the utilization of arable land, sufficiently irrigated, for the cultivation of cotton, for which the region is particularly suited. Very large stretches of land can eventually be sown under cotton through the utilization of the river Ily and its tributaries for the irrigation of the adjoining areas, estimated at 1,200,000 hectares. The work of irrigation is being carried on with the assistance of Arthur P. Davis, former head of the United States Reclamation Service, and a number of other American engineers.

About 40 per cent. of the increase in the area under cotton will be obtained through irrigation ; the remaining 60 per cent. will be secured by planting the land under grain and other crops most suitable for cotton growing. With the reduction of the area under grain, Central Asia and Kazakstan will require about 1,400,000 metric tons of wheat from other regions in 1913, and this will increase to about 2,800,000 tons when the entire wheat area is planted with cotton. It is estimated that by importing wheat directly from Siberia *via* the Turk-Sib railway an annual saving of 75,000,000 roubles will be realized.

The production of the cotton area of Central Asia will be considerably increased by the fertilizers to be supplied by the new plant under construction in Semipalatinsk. Equipment for the cultivation of the cotton fields will be secured from the agricultural machinery factory at Omsk. The orders for the first year (1930-31) include 29,000 ploughs. Other machinery will be secured from the new enterprises in the Altai region and the Kuznetz Basin, and coal from the latter district.

Siberia will also be the main source of the lumber supply for Central Asia and Southern Kazakstan. For the year 1930-31 the estimated import of lumber is given at 3,700,000 cubic meters. If Siberia is to meet this demand its timber production must be increased considerably. Hitherto all timber for Central Asia was obtained in the Urals. By using the Turk-Sib route for transportation there will be an annual saving in this item of 7,500,000 roubles.

Sections of Kazakstan are particularly rich in mineral resources, and the soil is suitable for the production of grain and industrial crops, such as rice, cotton, kenaf, kendyr, hemp, tobacco, crude drugs and rubber substitutes. The coming of the railroad will bring about sweeping changes in cattle-raising in Southern Kazakstan. At the close of the Five-Year Plan period it is estimated that there will be 34,000,000 head of cattle, or double the present figure. Several new large cattle breeding centers and more than two hundred collective farms are projected for the next few years. Kazakstan is the greatest sheep breeding region in the U.S.S.R. It produces the best sheep casings, which constitute a large export item, and is also noted for its wool production.

The extensive cultivation of fruit and vegetables in Central Asia is also anticipated. The southern regions of Kazakstan and the Central Asiatic Republics are famed for apples, grapes and various other fruits. It is planned to develop the area of orchards and gardens from 3,448 hectares to 20,000 hectares with a total output of about 120,000 tons. The grape area will be increased to 2,000 hectares.

The parts of Kazakstan traversed by the Turk-Sib are rich in non-ferrous metals. The copper, zinc and lead deposits of the steppe land in eastern Kazakstan and in the southern Altai Mountains are among the richest of their kind in the world. At present they are exploited to a very limited extent. Karkaralinsk, to the west of Semipalatinsk contains large iron ore deposits, while in the immediate vicinity of Semipalatinsk there are extensive gold deposits.

The construction of the Turkestan-Siberian Railway will be the signal for the development of many industries connected with the products and natural resources of the territory opened up. Already the increase in industrial crops has given an impetus to much construction work. Cotton, woollen and silk mills, tobacco factories, tanneries, glass factories, etc., are being constructed to cope with the sudden industrial development of a hitherto undeveloped territory. In addition, many enterprises are planned in connection with the cultivation of sugar beets, rice and rubber, besides plants for the manufacture of building materials, such as cement, tiles, bricks, etc.

The salt and fishing industries are also well represented in Kazakstan. There are many salt lakes in the region of Turk-Sib aside from Lake Balkhash, the largest one, which is also particularly rich in fish.

Through the establishment of direct transportation from Siberia *via* the Turk-Sib railway large quantities of grain and other products hitherto supplied by the Northern Caucasus, the Ukraine and the Volga region will be made available to supply the needs of other sections of the U.S.S.R. This will help in increasing the surplus grain for export from these regions. Bordering, as it does, on the Mongolian and Chinese frontiers, the Turk-Sib line should be an important factor in expanding the industrial possibilities of those sections, which will be linked up to a certain extent with the world markets by this line.

The cultural significance of the Turk-Sib railway is undoubtedly enormous. The film "Turk-Sib," now being shown in the U.S. by Amkino, demonstrates this fact in a vivid manner. The population of Kazakstan is mainly nomadic. The Kazaks are being carried from primitive modes of life into the most advanced industrial world. They are making a jump from animal breeding and simple cultivation, with primitive implements, to a world of the most up-to-date machinery, factories and mills. The Kazaks must learn all the trades and professions connected with the operation and maintenance of a modern railway system and the handling of machinery built according to the latest American models. Turk-Sib signifies an industrial revolution for the peoples of Central Asia.

Soviet Wrecks Largest Foreign Mining Concession in Russia

AFTER four years of constructive effort on the part of Lena Goldfields, Ltd., this company's Russian enterprise has been completely wrecked by the Soviet. In 1925 The Soviet granted this undertaking concessions in Siberia and the Urals which covered a total area as large as the British Isles. These lands were very rich in gold, silver, copper, lead, zinc and iron. Before the Revolution these mines not only yielded 20 tons of gold annually, but supplied 90 per cent. of the silver mined in Russia, and included the largest copper, zinc and lead mines in the country.

When the Lena Goldfields took over this concession they were simply resuming control which had been British before the War. In doing so they agreed (1) to abandon all claims against the Soviet for the huge losses sustained by the undertaking when it was nationalized, and (2) to lay out upon the development of the mines a capital expenditure of $11,000,000. Most of the mines were in a derelict condition, the machinery having fallen into ruin.

Under the agreement, finally signed in 1925, the Soviet promised the concessionnaires full freedom to import supplies and to export capital, and guaranteed them labor conditions on an equal footing with those enjoyed by State undertakings. Thus reassured, the company began a four years' period of reconstruction. The company has paid no dividends, all its profits having been sunk again in the development of the mines, in the confident expectation that this outlay would eventually be justified by increased output. A typical example of this expenditure was the erection of a giant dredger at the Lena mines in northern Siberia. Its transport to the inaccessible goldfields necessitated the construction of special trains, the building of bridges, and the laying down of new roads. The transport cost more than the dredger itself, and the total outlay on this single installation reached $3,000,000.

Townships were erected to house the thousands of laborers employed. The concessionnaires, in fact, exceeded their side of the contract. They spent $17,500,000 in establishing these industries. The end of 1929 saw the end of these preliminary and reconstructive labors and this year the combined undertakings were to have made their first profits for stockholders. It was estimated that an income of £2,000,000 ($10,000,000) would be produced annually.

However, without warning and in violation of the agreement, agents of the Ogpu raided simultaneously the main works of the company in Siberia and the Urals and all the agencies established throughout the Union. Under the agreement the company's books were immune from inspection, but the Ogpu carried them off, together with many other documents. Then began a trial in Moscow. Certain Russian employees of the company were charged with plotting against the Government, and eventually convicted and condemned. The trial soon revealed itself as in reality the trial of the British company itself. Charges of sabotage and incitement were made against the experts and officials without the company being able to reply.

Meanwhile the company had called into operation the clause in the agreement providing that in the event of a dispute the matter should be decided by a court of arbitration. The company appointed Sir Leslie Scott, K.C., as its arbitrator. The Soviet acknowledged the summons and appointed a Russian professor to represent it, and a Heidelberg professor was appointed, as super-arbitrator. Later the Soviet repudiated this court, which as a result is holding its meetings in Berlin without the Russian arbitrator.

The activities of the Ogpu made it impossible to carry on the working of the mines, and dangerous for foreign employees of the company to remain in Russia. Feeling that they were responsible for the lives of the experts they had appointed, the directors took the step of recalling them. Consequently work is now at a standstill.

Russian Oil Chief Plans Big Expansion in The Far East

WHEN Gregory Hippolytevitch Lomov, chairman of "Soyuzneft," (the United Oil Trust of the Union of Socialist Soviet Republics) paid a whirlwind visit to London recently he found time for only one interview, and that he granted the correspondent of the *Far Eastern Review*.

"The object of my brief visits to London, Paris and Berlin," said Mr. Lomov, "is to acquaint myself with the work and possibilities of our trading organizations and to meet the directors of the petroleum groups with which we have done extensive business in past years.

"After an absence of three years from the Soviet oil industry, I returned at the end of 1929 to the board of management of what is now the entire oil industry of the Union-Soyuzneft. This trust handles sales, production, construction, transport and exploration. The first months of this year I spent in a visit to our principal producing areas, Baku and Grozny, to familiarize myself with the work under way, and the possibilities of expanding production as and when necessary. I must say that my visit convinced me that we will be able to meet every increase in demand both from our own internal market and from the rapidly growing markets outside.

"The tasks we have set ourselves for the coming year will not only be achieved, but we are also certain of accomplishing the programs for the remaining three years of the Five-Years-Plan. It is frequently mentioned in the European press that if the Government's maximum plans for the development of motor transport and the use of tractors are realized, there must be a restriction in the quantities of our petroleum for export. I must say emphatically that there are no grounds whatever for such opinions. Our plan for the development of the oil industry is based on the complete requirements of the internal market, as well as the further growth of our sales in other countries.

"The amount of drilling, additional refineries and installations, as well as pipe lines, tankers, etc., erected and under construction, guarantees the complete solution of all the problems connected with this phase of our work. Our Grozny subsidiary has started the exploitation this year of the New Maikop fields, which within the next two or three years promise as great an output as the entire yield of the Grozny fields up to the time of the war. The rich light oils of Maikop give the high yield of 35 per cent. gasoline. With such a new field coming in, we feel secure that the practicability of our plan, which aims at the introduction of over 40,000,000 tons in 1932-33, will be assured.

"On the production side, at the present time we are not only busy in the existing fields of Baku, Grozny, and Emba, but also in new areas such as the Chussova in the Urals, Sakhalin, etc. In the field of refinery construction we have commenced an extensive enlargement of 'cracking' facilities, and the reconstruction of our lubricating oil production facilities.

"Naturally, we are giving as much attention to the specialized requirements of our foreign customers as we do to the production of the tonnage which they need.

"We are interested in cementing our relationships with the principal national petroleum groups in the European markets, as we are always seeking wider outlets for our goods. During my journey I have had the pleasure of meeting the leaders of firms who have large contracts with us—the Benzol Verband, the Petrofina Francaise, etc. We have discussed the possibility and practicability of more extensive business relations between us.

"In addition, we will continue to maintain our own trading organizations in the principal European markets. Their work has been very satisfactory. Among them are Russian Oil Products, Ltd., in Britain, Derop and Derunaft in Germany, and mixed companies in France and Italy. These companies, in each case, are capable of increasing the sale of our oil in their respective countries.

"We are also interested in the further development and enlargement of our contracts with the international groups, especially with such firms as the Vacuum Oil Co., Standard Oil Co., of New York, and the Anglo-American Oil Co., Ltd., all of which have recently signed new contracts with us.

"The development of our oil export compels us to widen the market for our output in the countries to which we are already exporting our oil products. A significant increase in production in our oilfields on Sakhalin Island makes us, for the first time, turn our attention to the Far Eastern market, where I hope and believe, we will soon be marketing considerable quantities of Soviet oil. I am confident that a great future lies ahead of the Sakhalin oilfields and that Sakhalin oil will offer very imposing competition for the oil trade of the Far East within the next few years.

"I intend visiting the United States this summer, there to make a general study of the oil industry. We have no definite plans for entering the American distributing trade, although, of course, one cannot tell what the ultimate future holds in store. Incidentally, the oilfield equipment which we have imported from America for use in opening up Soviet oilfields has proved thoroughly satisfactory, and further orders for such equipment are likely to be placed.

"I have no fear of the production of oil from coal affecting the demands of our export markets. It will be a considerable time before this development can be placed on a commercial footing, and meantime we are firmly establishing ourselves in the markets of the world. However, we are definitely interested in this problem in relation to our internal needs. Some of the largest industrial areas in Russia are far distant from the centers of oil supply and it may prove economical for us to erect coal distillation plants to handle their needs.

"I have no doubt at all that the program for the development of our oil production, equally with that of the widening of our sales organization, will deal adequately with every problem connected with the export of Soviet petroleum products."

The industry is progressing at a rapid rate, the production of oil now being at the rate of 16,000,000 tons per annum and increasing month by month. Of this over 5,000,000 tons will be exported during the present business year, which ends on September 30. According to the Five-Years-Plan, the figures set by the Government Planning Board for the year ending 1933 will be 42,000,000 tons of crude oil. Of this 15,000,000 tons are to be taken from fields that are not at present large-scale producers. The Far East is the principal new market for the enormous exportable surplus the industry is bound to have within the next few years.

The rapid development of motoring and the needs for tens of thousands of tractors, as well as the much larger mechanical organization to be created throughout Russia, make it essential that the oil industry shall stride ahead of other Soviet industries. Incalculably larger quantities of kerosene will be necessary for farming purposes, while, on the other hand, there will be large quantities of benzine to introduce on Far Eastern and other export markets. It may be estimated that the export of Russian oil will increase at as quick a ratio as the consumption of oil on the Soviet market itself.

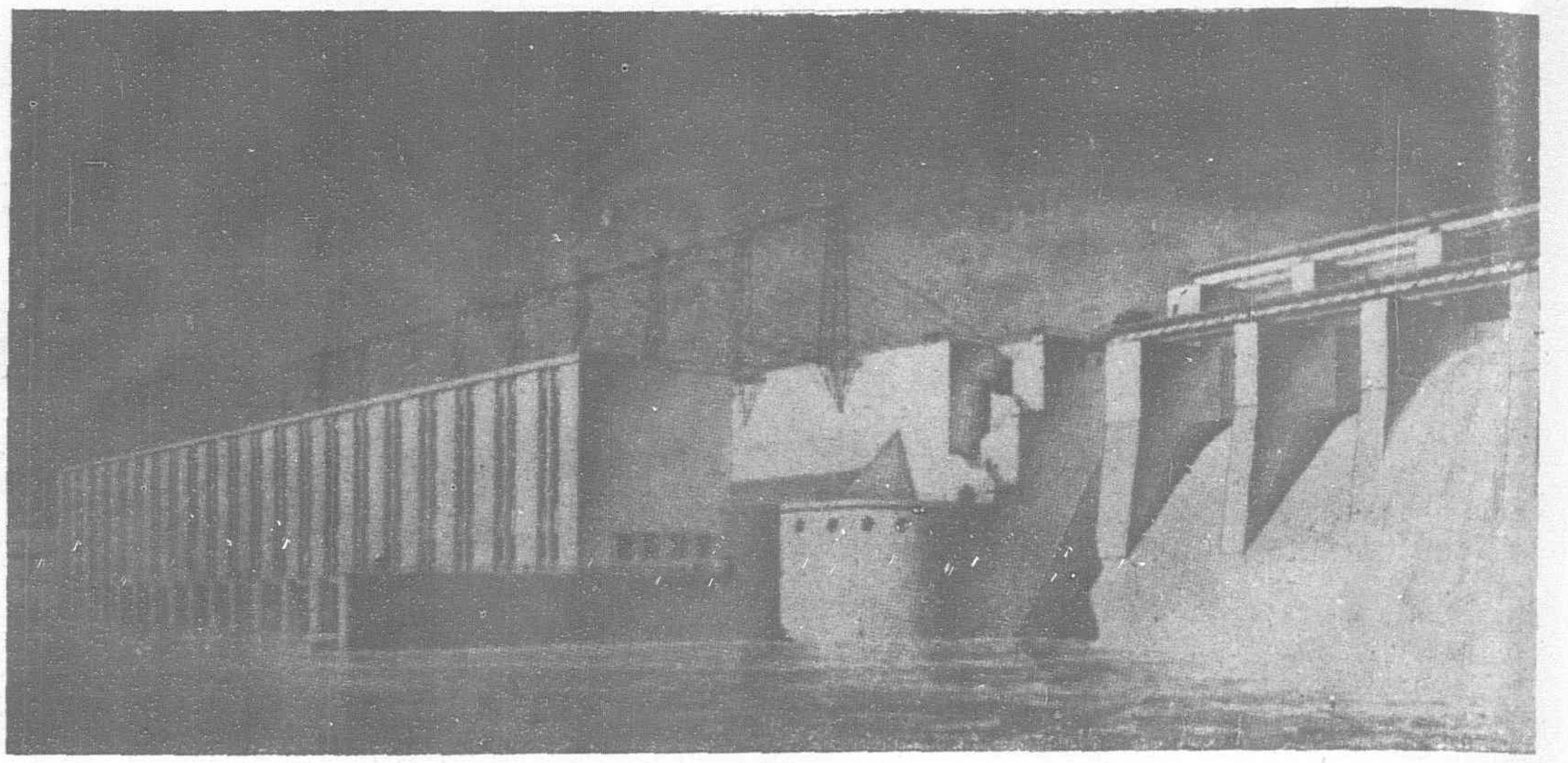
As a result, there has been a tremendous increase in the meterage of drillings and building of refineries, large and longer pipelines, additions built both in Russia and abroad to the tanker fleet, the improvement of oils, the preparation of products that are new in the Soviet oil industry, involving asphalt, coke, paraffin, wax, medicinal vaseline, medicinal paraffin, carbon black, and other more intensive products, including chloroform, helium, methyl alcohol, fatty acids, etc. During the year, owing to the extension of pipeline facilities, the cost of delivering oil to the Black Sea Board has been substantially reduced, it being estimated that new pipelines pay for themselves in from four to five years' operation.

By 1933 the Soviet will own probably 110 cracking plants, which will yield approximately 15 per cent. of the gasoline produced. This will in turn reduce the amount of fuel oil for export.

Taking all in all, the immense increase in production, linked with the economies in refining and transportation, the wider use of cracking, and the more intensive chemical exploitation of the various crudes and their blending, will make the Soviet Union's oil industry one of the outstanding in the world. By 1933 Soyuzneft will have passed the Royal Dutch Shell group in its figures of production, and will then rank second only to the Standard Oil group. It will then be in the market for machinery, electrical equipment, and ships, in order to hasten its development still further.

Biggest Hydro-Electric Generators in the World

Under Construction by the General Electric Company for the U.S.S.R.



Model of Dnieper Hydro-Electric Power Plant

Four hydro-electric generators, so far the largest in the world, are being manufactured at the Schenectady Works of the General Electric Company, for installation on the Dnieper River in the Ukraine. The development will supply power to an area of about 70,000 square miles in the vicinity of Dniepropetrovsk and through the southern part of the Union of Socialist Soviet Republics.

Winding through this section flows the great Dnieper River, emptying into the Black Sea, and providing an artery of commerce. Navigation, however, is not continuous, due to a stretch of rapids which separate the shipping of the lower section from that of the upper reaches. Overcoming this natural barrier by means of a ship canal will have a great economic influence and an important transportation feature is to be added in a railroad that will bring into easy communication those sections that produce iron and those which produce coal, coke, manganese and limestone thus expediting and cheapening the production of steel.

All four of the big 77,500 kv-a. generators will be driven by water turbines now being built by the Newport News Shipbuilding and Dry Dock Company.

The total weight of each generator will be approximately 1,760,000 pounds, while the weight of the rotor and shaft will approach 980,000 pounds. The maximum diameter is approximately 42 feet, while the generators will have an overall height of 40 feet, 5 inches, of which 17½ feet will extend above the floor of the plant.

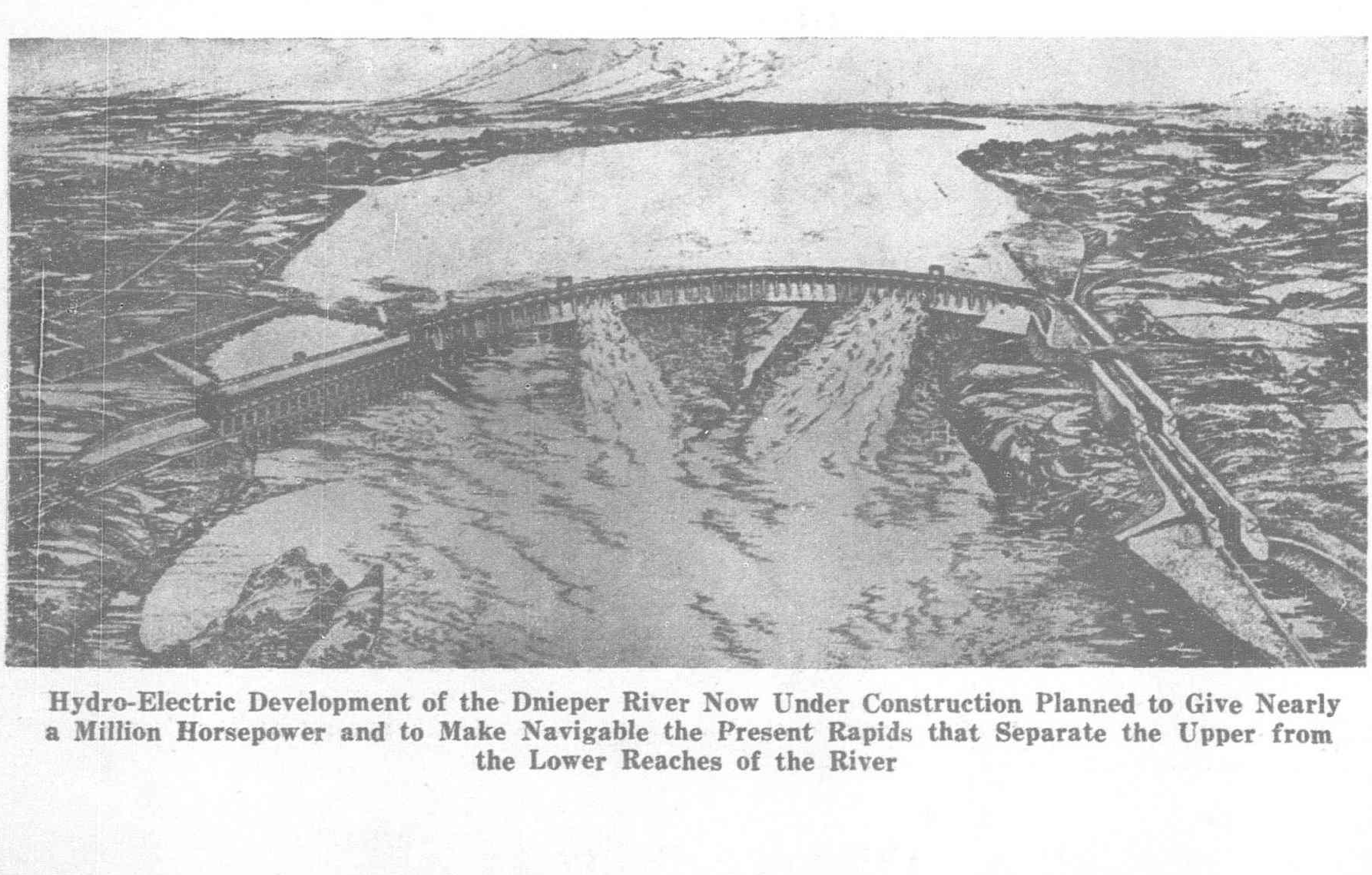
Large castings have been eliminated by the use of fabricated welded construction. Shipment of several thousand parts will be made by railroad from Schenectady, New York, where they will be loaded on a boat bound for the mouth of the Dnieper River. Though railroad facilities in that section of the Union of Socialist Soviet Republics are considered good, part of the shipment will be made by barge up the river to the site of the plant, where two 250-ton cranes will have to be installed to handle and assemble the apparatus. About 130 railroad cars will be required for the shipment from the factory.

Due to shipping limitations, the stator of the generator will be made in six sections, the punchings and windings to be assembled in each unit at the factory. The rotor will be completely dismantled for shipment. The heaviest single piece to be handled will be the 40-inch steel shaft, 36 feet long, with a coupling flange on the end which is 70 inches in diameter. This part will weigh about 136,000 pounds. It will be shipped on a special car, as will be the hub for the upper bearing bracket which is 16 feet in diameter. This latter piece will be routed a round-about way to New York to insure railroad clearance.

The last of the four units is scheduled for shipment early in 1932. Negotiations for the generators were completed with the International General Electric Company by the Amtorg Trading Corporation of New York, American representatives of the Union of Socialist Soviet Republics.

Hugh L. Cooper and Company, of New York, are the consulting engineers, and are now at work on the construction of the dam and power station.

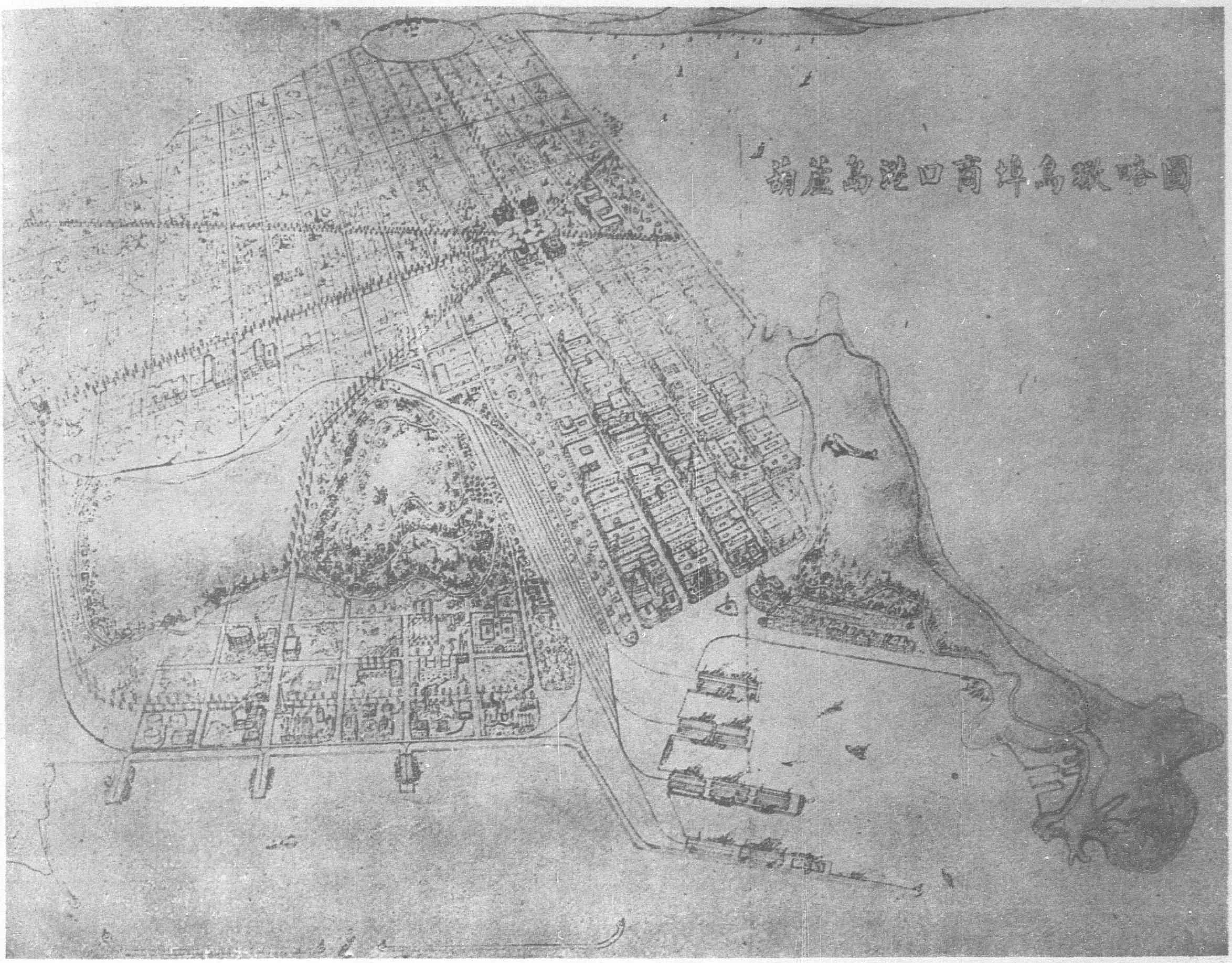
The field in which the Dnieper power is to be utilized is a large one as has been intimated and in addition to existing industries, the government is proposing to build and feed with power over high-voltage transmission lines, new foundries and rolling mills of great capacity and plants for the large scale production of aluminum and other products, all of which will make use of the natural deposits in that section.



Hydro-Electric Development of the Dnieper River Now Under Construction Planned to Give Nearly a Million Horsepower and to Make Navigable the Present Rapids that Separate the Upper from the Lower Reaches of the River

Blackman Fans

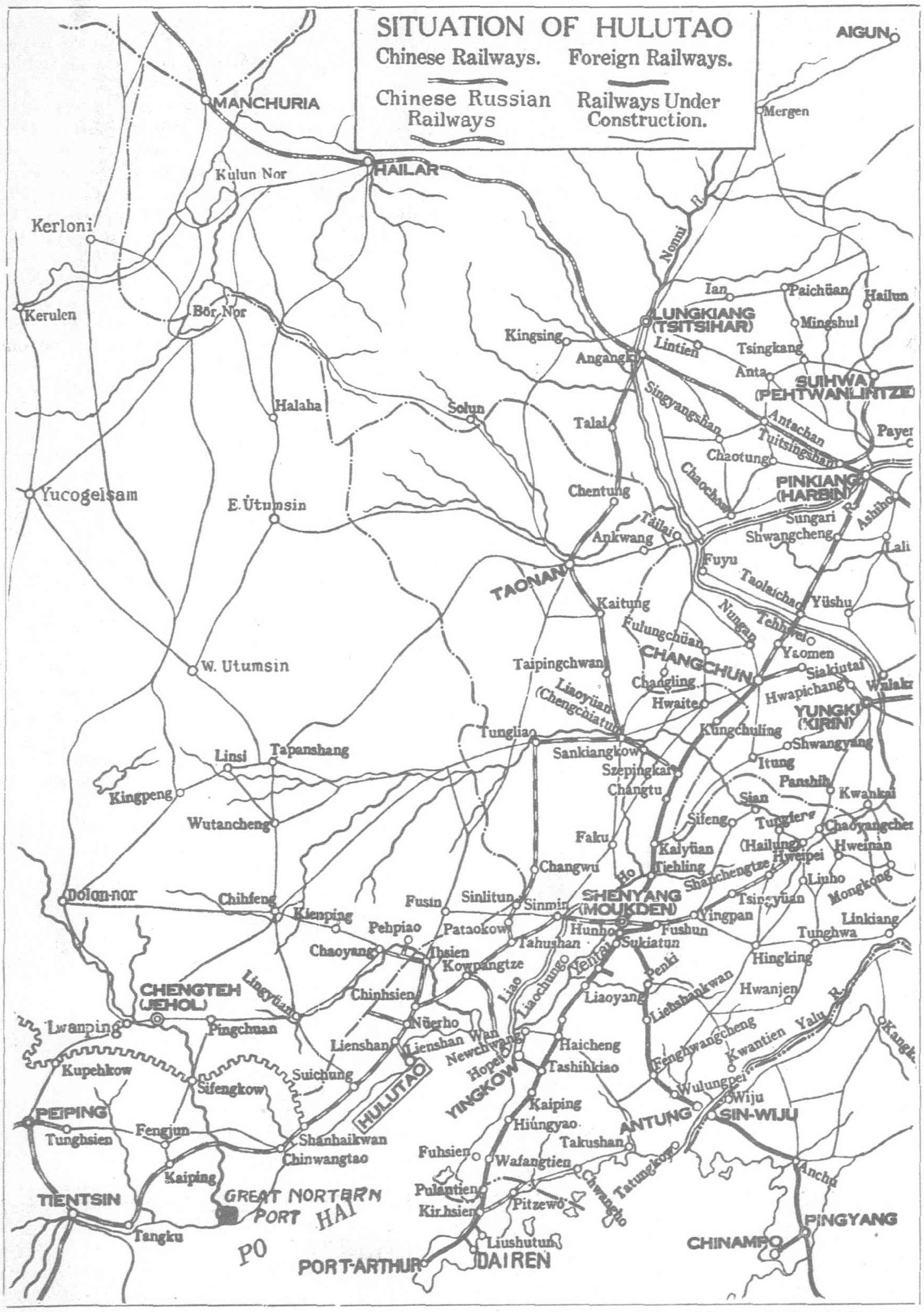
The Blackman Export Company has issued a new pamphlet on their ventilating fans and exhaust equipment with an interesting list of typical export orders which includes many important installations in the Far East and Asiatic countries, such as the British-American Tobacco Company's plants, Green Island Cement Works, Hankow Water Works, Kofu Dento in Japan, South Manchuria Railway, Taikoo Dockyards and many textile and other industrial establishments. The illustrations include examples of streamline electric fans for works, air conditioning plant for public buildings and theaters, mine ventilating installations, cupula blowers etc.



Plan of Hulutao Harbor and Proposed Street System of New Port

Conservancy Works in China

[EDITORIAL FOREWORD:—The following résumé of the official report of the Conservancy Department of the National Construction Commission on its accomplishments during 1928-29 and its plans for the future, are of interest as indicating the set policy of the Nationalist Government to adhere faithfully to the plans laid down by Dr. Sun Yat-sen for the development and reconstruction of China. There may be a legitimate cause for protest on the part of British interests for the diversion of the surplus profits of the Peking-Mukden railway to finance the Port of Hulutao construction, but as long as these protests go unheeded and the work is pushed ahead, the scheme will be realized and the port will serve its purpose of attracting the traffic of the Chinese owned railways in Manchuria and Mongolia to this much needed deep water outlet in Chinese territory. The development of Manchuria will provide enough traffic to keep both Dairen, Newchwang and Hulutao busy, as well as Seishin in Korea, when through rail connections with Kirin are completed. The urgent necessity of a Great Northern Port as outlined in Dr. Sun Yat-sen's scheme either between Taku and Chingwangtao or at Hulutao, is made clear in the article appearing in this issue on the Chinese Eastern Railway. Such a port under purely Chinese jurisdiction, with its strategic and colonization railways reaching out to the Far Western borderlands of Mongolia and Sinkiang with branches terminating at points on the Siberian-Mongolian frontier, is the only move that China can possibly make to checkmate Russian economic and political penetration into these regions. This port of Hulutao is being constructed at a cost of $6,400,000 gold or say $20,000,000 silver at the present average exchange, or one half the estimated first cost of Dr. Sun Yat-sen's Great Northern Port. If the money is to be spent on Hulutao, the Great Northern Port scheme must be definitely shelved and the outlet to Dr. Sun's eminently practical railway system shifted to the more northern port. In so far as Hulutao is a divergence from a general scheme of supreme national importance for a purely local one coming under the jurisdiction of the Mukden authorities, it is open to severe criticism. It stands to reason that a semi-independent state like Manchuria, is not particularly interested in any program that is not purely regional in character. Hulutao, viewed from this angle, is a hindrance to the future unification of the country under a strong central government, and a barrier to the carrying into execution of any comprehensive program for the proper defense of the nation. If Hulutao is to become the Great Northern Port of China, with the strategic railways for the defense of the nation radiating from that terminus, then it is clear that unless the recognized government has full control and jurisdiction over this port and its hinterland, the burden of defending China against the menace from the direction of Urga must be borne by the Manchurian



(*From "Port of Hulutao"*)

Map Showing Location of Hulutao and the Great Northern Port of Dr. Sun Yat-sen's Development Scheme

War-Lords. The entire cost of the Manchurian and Mongolian system of defense railways should not exceed $200,000,000 gold, a mere bagatelle compared to the total of three and a half billions squeezed out of the Manchurian farmers to pay for the campaigns of their ambitious War-Lords.

A further note of compelling interest in the following report, is the scheme for the development of the Great Eastern Port in Hangchow Bay with its proposed canal comecting Hangchow with Wuhu on the Yangtze River. The cost of this work is approximately the same as that of the Great Northern Port, or $44,000,000 silver. The completion of this project, will necessarily have a marked effect upon the position of Shanghai as the outlet for the trade of the Yangtze Valley, diverting practically all the up-river junk traffic through the Wuhu canal to the deep water outlet on Hangchow Bay.

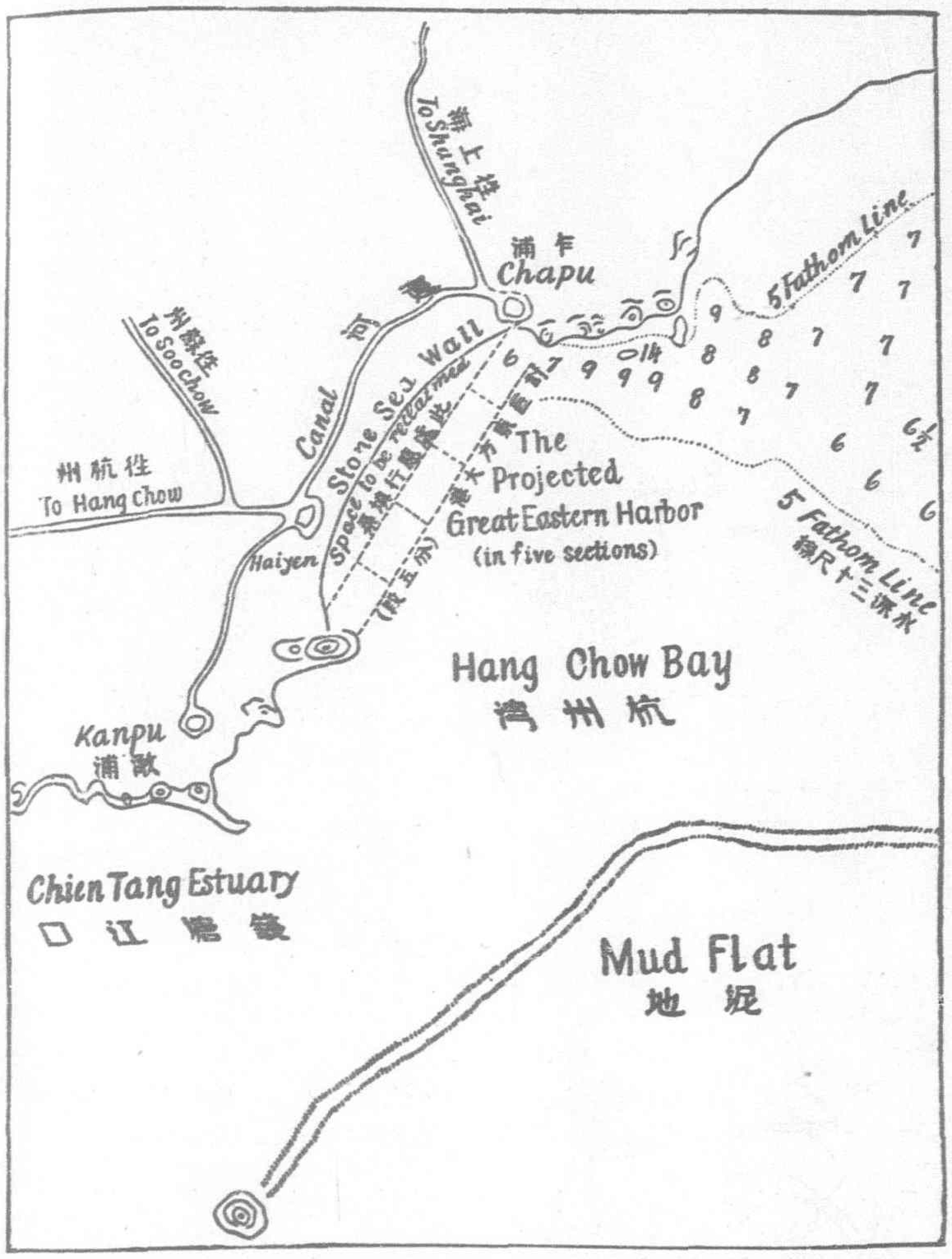
As to financing these schemes, it is of interest to the engineers of other nations to learn that the main source of capital to carry forward the work, is to be derived from the remission of the Netherlands Boxer Indemnity. If this plan is carried out, it means that a practical monopoly of building China's great harbors will go to Dutch concerns, who, it must be admitted, are experts in this branch of engineering. At any rate, if the Dutch Boxer Indemnity Funds are to finance the port works, Dutch engineers are justly entitled to preference over others in carrying out the contracts; a guarantee to China and the rest of the world that the work will be well done.]

Abridged Report of the Conservancy Department of the National Construction Commission during 1928-1929

Floods are one of the main causes of China's famines. The Hwai River, flooding large areas of land in Anhwei and Kiangsu every six or seven years, causes a yearly loss of food equivalent to 25,000,000 piculs of rice. Hopei province is another place where floods are frequent. The narrow Hai Ho is inadequate for the discharge of large volumes of water in that province. The value of the yearly loss of rice is probably $20,000,000. The Yellow River, which does so much damage now as previously, is yet another potential enemy of the country. In 1925, it broke through a dike in Shantung, flooded 800 square miles of land and damaged $20,000,000 worth of farm products. Besides these important floods, there are many minor ones in nearly all parts of the country in rainy seasons. It is estimated that the total yearly loss due to floods in China is at least $200,000,000.

With these facts in view, the National Government entrusted to the National Construction Commission to deal with the situation and prevent further disasters caused by uncontrolled rivers. As a result of long preparation, the Conservancy Department of the National Construction Commission was organized in November 17, 1928, with the following specific functions:

(1) All works relating to improvement of rivers and lakes.
(2) Planning, designing, execution and administration of conservancy works.
(3) Construction and administration of irrigation works.
(4) Reclamation of river and lake acretions.



The Great Eastern Port Near Hangchow of Dr. Sun Yat-sen's Reconstruction Scheme

(5) Development of water power.
(6) Construction of proposed harbors as enumerated in Dr. Sun's schemes for the Industrialization of China.
(7) Supervision of provincial conservancy bureaus.
(8) Other matters relating to conservancy works.

Work of this Department since 1928 to the end of 1929 are reported in the following:

A.—Harbor Construction Works

1. *Hulutao*—Hulutao, a promontory projecting into the Gulf of Liaotung, is located in N. 40° 44′ and 121° 1′ east of Greenwich, some 110 miles north of Chingwangtao and 184 miles south of (Mukden) Shengyang. It is about five miles long, having many hills, the highest of which does not exceed 400 feet. It is regarded by experts as the only location suitable for the purpose of constructing an ocean harbor north of Chingwangtao. It is free from ice in the winter and joins the Peining Railway at Lienshan, thereby capable of drawing traffic from almost all parts of Manchuria and East Mongolia. Sheltered inside the Gulf, it is not subject to typhoons and the preliminary works constructed some twenty years ago can now be utilized in the present scheme.

The contract for the work was signed in Tientsin on January 24, 1930, between the Peining Railway Administration, represented by General Kao Chi-yi, managing director, under the instruction of the Ministry of Railways and the Supervision of the North-eastern Commission of Communications, and the Netherlands Harbor Works Company of Amsterdam, Holland, represented by Robert de Vos. Two and a half or three years from now, a part of the harbor will be available for commercial operations.

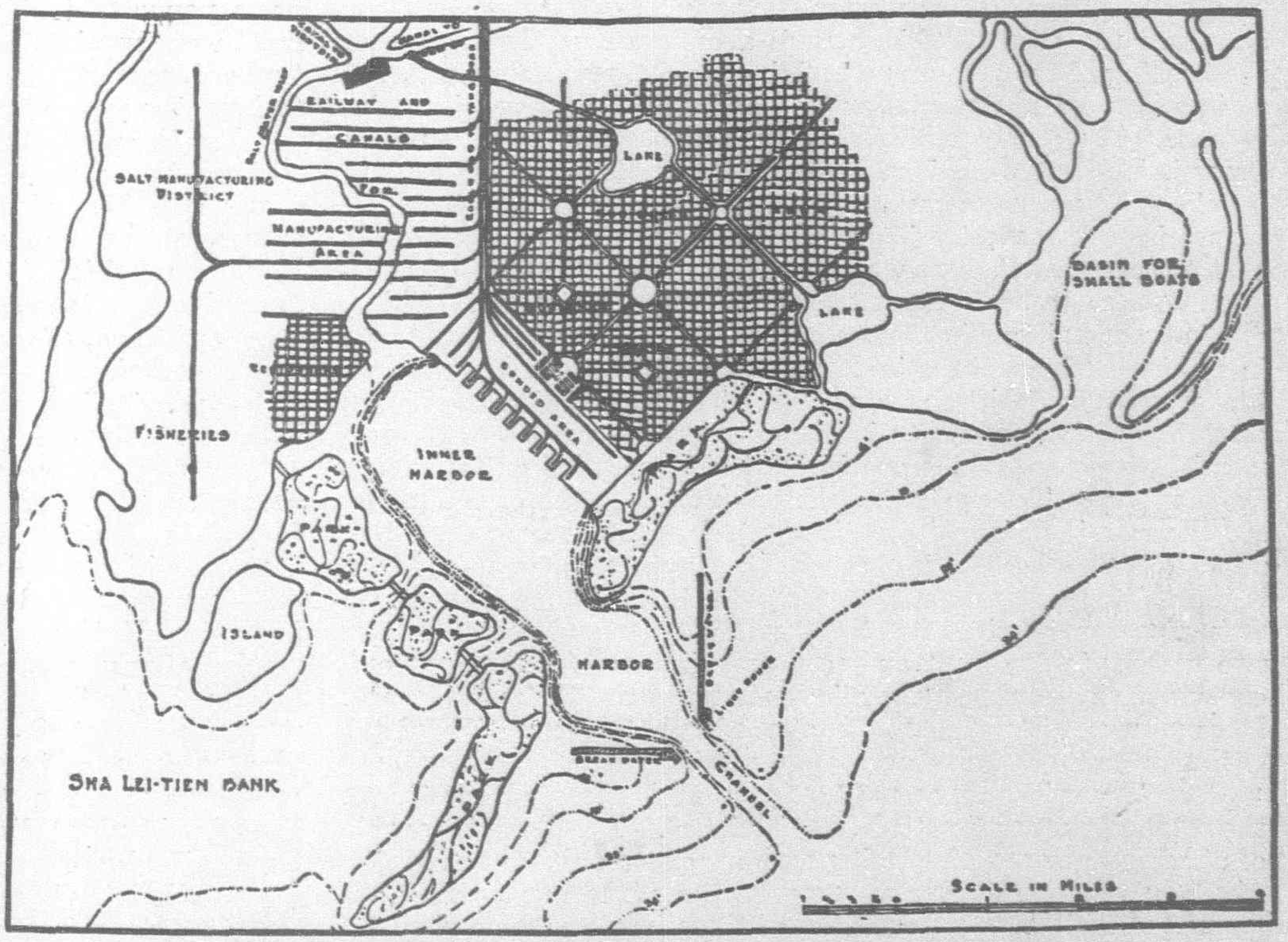
When completed, there will be a berthing line of 8,800 feet, sufficient to accommodate 16 steamers of 400 feet each and other smaller crafts. The harbor can be expanded to accommodate 100 steamers. With Newchwang excepted, Hulutao is the nearest seaport of Liaoning, Kirin, Heilungkiang and Jehol. It has the advantage over Newchwang because it is ice-free and capable of berthing deep draft sea vessels. It is proposed to make Hulutao a free port. If this is adopted there would be a zone of a few miles within which no Customs Duties are to be levied. This will encourage the growth of industry and trade in this district and prove a strong competitor to Dairen, the Japanese leased port of Manchuria.

The contract contains 16 articles. The work was started on April 15, 1930, and is to be completed October 15, 1935. For the various works, a sum of U. S. G. $6,400,000 is to be paid in monthly instalments of G. $95,000 each, a price appraised by experts as reasonable. The specifications consists of seven items; (1) Breakwater. Two breakwaters will be built, one at the southern part and one at the south-western part. The southern one has a length of 4,100 feet and the south-western one 1,000 feet. (2) Quay-walls consisting of three sections of 800 feet, 1,200 feet, and 1,700 feet respectively will be erected. (3) Construction pier; The construction pier of a rubble mound, is to be 900 feet long. (4) Retaining dikes. (5) Dredging of harbor basin and an entrance channel. (6) Reclamation of low grounds and part of the foreshore. (7) Excavation of Bon Lan Shan and Kao Liang Tou To.

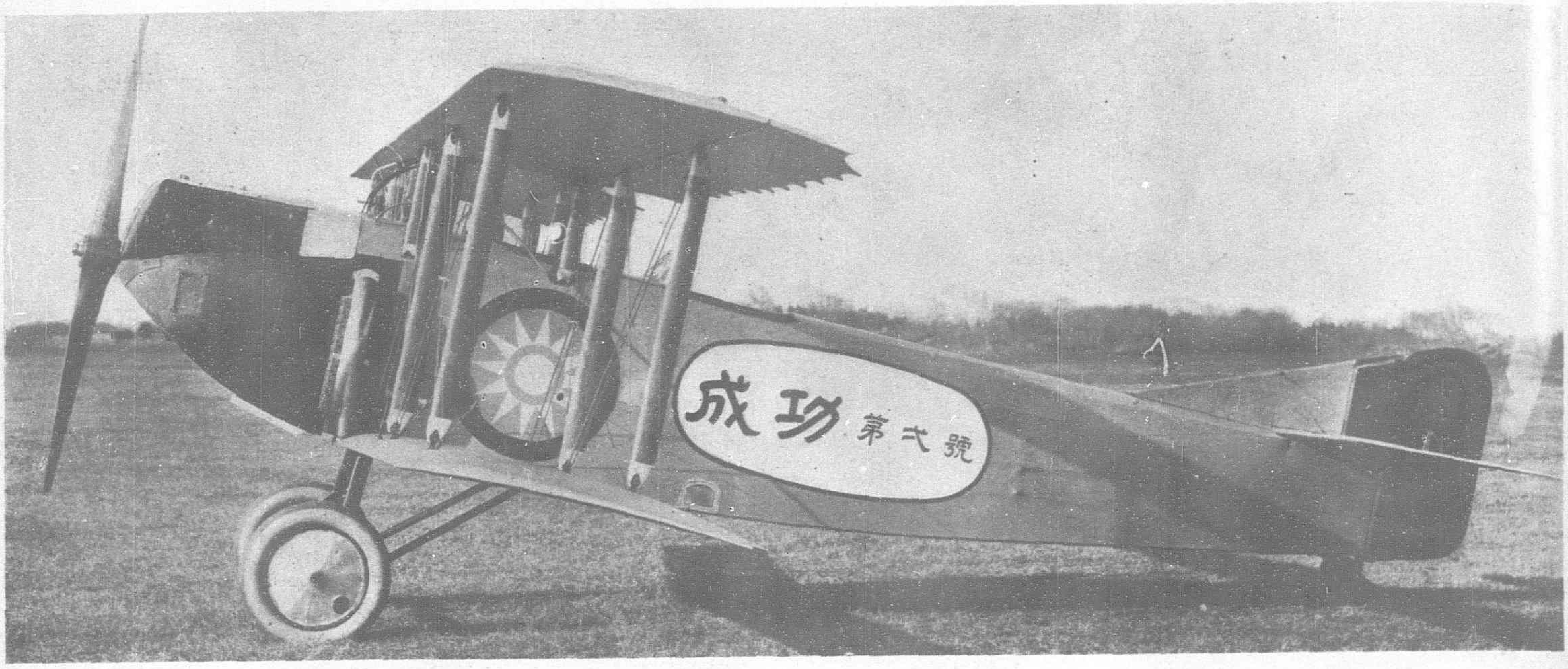
2. *The Great Eastern Port.*—The Great Eastern Port is on the north shore of Hangchow Bay. The harbor has a depth of from 24 to 30 feet at low water. The proposed port when constructed can be easily connected with the Shanghai-Hangchow-Ningpo Railway, of which the nearest station is only 30 miles away. Chien Tang River runs directly from the inland cities to the port. These will enable this port to be connected with all the fertile regions of Chekiang as well as its industrial centers.

In a lengthy memorandum submitted to the National Government, the Reconstruction Commission pointed out the necessity of such a port, notwithstanding that Shanghai is nearer the mouth of the Yangtze and not far away from Hangchow Bay. The trouble with Shanghai is that the Yangtze river carries a tremendous volume of silt which yearly deposits an area 40 sq. miles 10 feet deep, while the Chien Tang River carries very little silt. Another

(Continued on page 507).



The Great Northern Port of Dr. Sun Yat-sen's Scheme, Located at the Mouth of the Taching River, Between Taku and Chingwangtao



Cheng Kung ("Success") No. 1 Made at the Chinese Government, Hungjao Aircraft Factory, Near Shanghai

Aeronautical Progress in China

Judging from the rapid development of aeronautics in this country, we may be justified in saying that China is going to skip the water and land stages of communication and enter directly into the aerial stage. The planning of various air routes, the round-China flights by two aviators, the construction of aerodromes at important centers, and the completion of "made-in-China" planes all bear testimony to the rapid development of commercial aviation in this country.

Commercial aviation in China began when in July, 1921, the Aeronautical Department inaugurated the Peking-Tsinan service, a distance of 250 miles, as the first lap in a scheme that was to join Peking and Shanghai, a distance of 900 miles. At the same time, a service between Peking and Peitaiho was started. This covered 241 miles, and connected the former capital with the coast. The Peking-Shanghai enterprise, however, failed to materialize, and even the trips to Tsinan were abandoned partly because of the flooding of the aerodrome in Tsinan and the small returns, but mainly because of financial and other troubles involved in maintenance. It was not until the inauguration of the Reconstruction Commission by the National Government of Nanking that a rapid development was witnessed. At present, there are more than 200 planes in China, mostly imported. It is important to point out that to-date seven "home-made" airplanes have made their appearance. There are at present three airplane factories in China, one in Shanghai, one in Canton, and another at Pagoda Anchorage in Fukien. The factory in Shanghai is situated at Hungjao on the western outskirts of Shanghai. The Shanghai and Canton factories are for manufacturing planes for military as well as commercial purposes and the one in Fukien for turning out seaplanes for the navy. The parts, the wings and the bodies of the planes are all made in China with native materials, the motor alone being imported The best of the seven planes manufactured in China is the "Cheng Kung No. 1" made by the Hungjao Aerodrome. This plane was built after the Cauldron type and accommodates two persons in the front and rear cockpits, one for the pilot and one for the passenger. The wings each measure 20 feet in length. It carries a Bristol 220 h.p. motor. With the exception of the engine all parts of the plane were made in China at a cost of only $3,000. The engine cost was $4,000, the work of assembling $1,000, the total cost approximating $8,000 (silver). The plane is capable of attaining a speed of 70 miles an hour and an altitude of 15,000 feet. In addition to the passengers, the plane can carry 1,000 pounds of mail. The construction of this plane was supervised by Mr. Sun Te-shih and Mr. Chow Chia-mu, the director and technical expert respectively of the Shanghai factory.

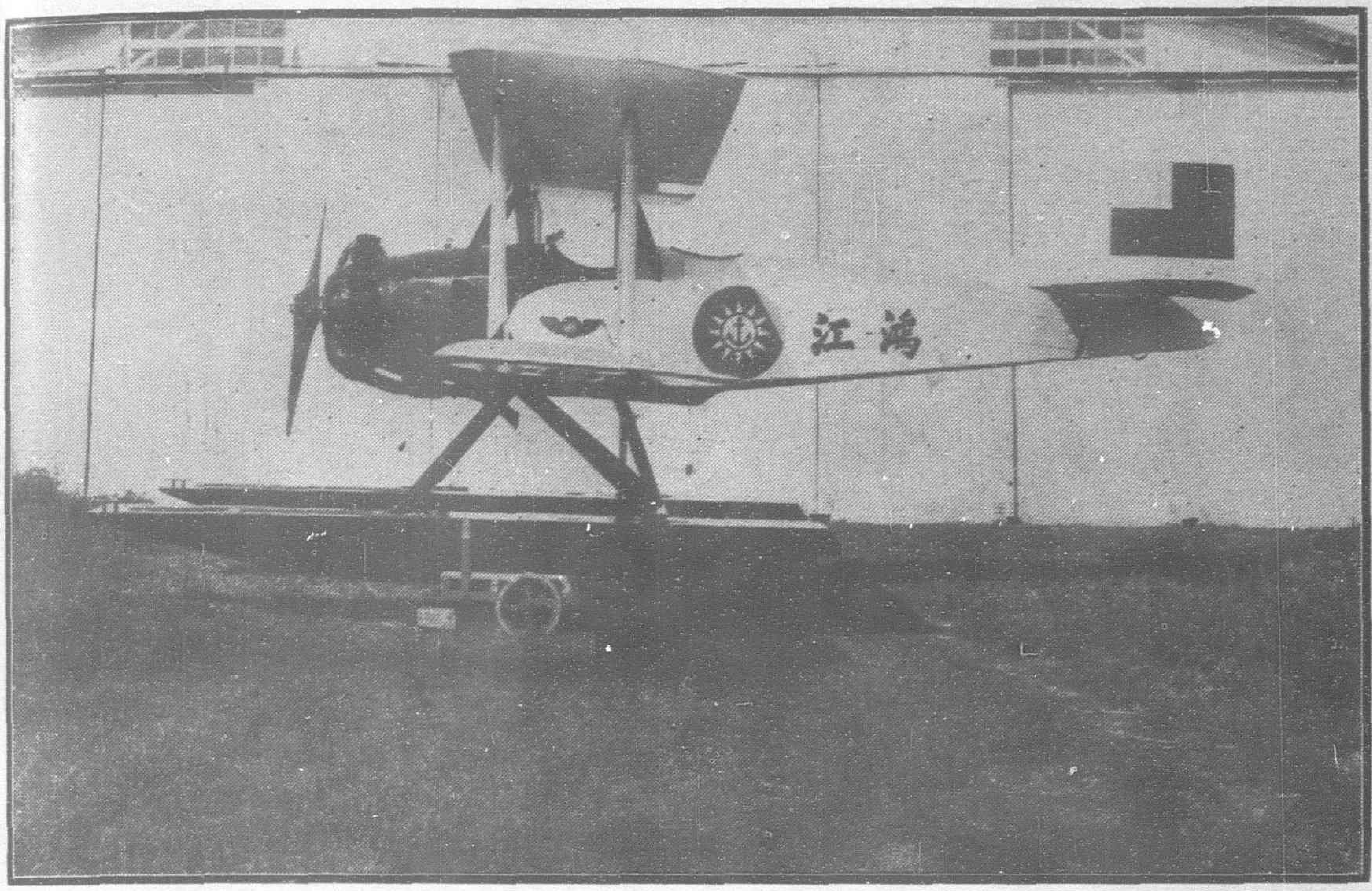
A three-seat reconnaissance seaplane, type "Chiang Hung," has just been completed at the Foochow naval air establishment and was thoroughly flight-tested last week by Chen Wen-lin and a German aviator in the Chinese naval air service, K. Hans Bertram.

Mr. Chen is the aviator who flew from London to Amoy two years ago and who is now commandant of the naval air station at Amoy. After completing its flying tests Chen and Bertram flew the plane to Amoy on official business and returned on it the next day. The distance of 160 miles to Amoy was covered in less than two hours although against a strong head wind of about twenty miles an hour all the way.

The seaplane "Chiang Hung" was designed by Wong Tsoo, director and chief engineer of the naval air establishment, and constructed chiefly of Chinese material. It is powered with a 165 horse power Wright whirlwind engine. The naval air establishment was organized in 1918 and has since designed and built many types of seaplanes and flying boats ranging from training machines to bombing and torpedo machines.

For the promotion and popularization of aviation among the masses, the round-China flight made by General Chang Hwei-chang and General Chow Chia-heng, have done much more to arouse interest than printed matter and lectures. General Chang Hwei-chang, chief of the Aviation Bureau attached to the 8th Route Army Headquaters, flew a Ryan monoplane from Canton to Shengyang and back, stopping at Hankow, Nanking, Peiping, Tientsin and Shanghai. General Chow, assistant of General Chang followed suit, also flying in a Ryan plane to Foochow, Ningpo, Shanghai and Nanking. He flew back to Canton after a short stay at Hankow.

As a result of these flights, public enthusiasm has been aroused. The first aeronautical association in China was formed in Canton. Later, this association was reorganized into the Committee for Aeronautical Defence. In Honan, the Northwest Aeronautical Association was organized. The associations in Canton, Kaifeng and Nanking all have as their object the promotion of passenger and mail services. In July an aviation conference met in the Capital and as a result, the three organizations were amalgamated on August 1, 1928, under the name of the Chinese Aeronautical Association. Five main lines have been considered by the Chinese Aeronautical Association. (1) The Shanghai-Hankow line, (2) the Canton-Shanghai line, (3) the Canton-Hankow-Szechuan Line, (4) the Peiping-Hankow Line, and (5) the Peiping-Shanghai Line. It is estimated that at least $200,000 is required as initial capital for the operation of the first three lines. The most important gesture of the National Government in the development of aviation is the formation of the Chinese



("*China Press*")

The seaplane Chiang Hung, was designed and constructed by the naval air establishment, at Mamoi, Foochow.

National Aviation Corporation. As a result of long negotiations a contract was signed between Mr. Sun Fo, President of the Chinese National Aviation Corporation and Mr. William B. Robertson, President of the Aviation Exploration Inc., affiliated with the Curtiss group of aviation companies in the United States. In accordance with this agreement, the American company became the operating concern, while the franchise is held by the Chinese company. This contract called for the operation of three routes and to fly 3,000 miles a day. In the middle of 1929, the first service was started between Shanghai and Hankow *via* Nanking and Kiukiang. Due to administratve complications Mr. Sun Fo, President of the Chinese company resigned and the contract was revised in August, 1930. The new contract covers three main lines which in due time may be extended to five. These three main routes are: (1) Shanghai-Hankow line, (2) Nanking-Canton line and (3) Nanking-Peiping line.

In August, 1930, another ambitious contract was signed between the Chinese Government and the German Lufthansa Company for the operation of Sino-German Air Mail and Passenger Service. The contract, it is learned, provides for the organization of a Sino-German Aviation Corporation in accordance with Chinese law for the operation of air lines. The Corporation is to have a capital of three million dollars to be divided into three thousand shares of $1,000 each. The Chinese Government will hold 2,000 shares; the German Company, 1,000 shares. Within three months after the coming into force of the contract, the Chinese Government is to pay up $200,000 of the subscribed share capital; the German Company, $1,000. Within nine months, the German Company is to advance adequate funds for the purchase of all necessary machines and equipment, and in consideration thereof, the Sino-German Corporation is to issue to the German Company shares up to the value of the funds so advanced. The administration of the Corporation is to be vested in a Board of nine directors, of whom six are to be nominated by the Chinese Government and three by the German Company. The Board is to have one chairman and two Vice-Chairmen. Under the Board there will be three departments; namely business, finance and operation. The capital and other cash assets of the Corporation are to be deposited in a Chinese bank. The Corporation is to operate the following air mail and passenger lines:—(1) Shanghai to Berlin: *via* Nanking, Tientsin, Peiping, Kulun and Siberia, (2) Shanghai to Berlin: *via* Nanking, Tientsin, Peiping, Manchuli and Siberia and (3) Shanghai to Berlin: *via* Nanking, Sinkiang, Kansu and Siberia. As soon as this is started, then, China will be linked to Europe directly. This will no doubt develop the economic relations as well as political relations between these two nations.

NEW TYPE TRANSPORT PLANE.—The new Boeing low-wing, all-metal monoplane is said to be the only single-engined airplane capable of carrying 2,300 pounds of pay load at a cruising speed of 140 miles per hour, in service.

On one engine, a 575 h.p. Hornet, with 2,300 pounds of pay load, cargo or passengers and cargo, the Boeing Monomail has a high speed of 158 m.p.h., cruises 140 m.p.h., climbs 850 f.p.m. to an absolute ceiling of 16,000 feet. Its body is five feet in diameter and cargo compartments total 220 cubic feet. This plane can carry 43 per cent. of its gross weight in useful load.

The Monomail has retractable landing gear, is carefully streamlined, and has a special Boeing engine cowl to smooth out the air flow. The plane incorporates numerous improvements suggested by Boeing System's 10,000,000 miles of flight on the Chicago-San Francisco and Seattle-San Diego mail, express and passenger lines.

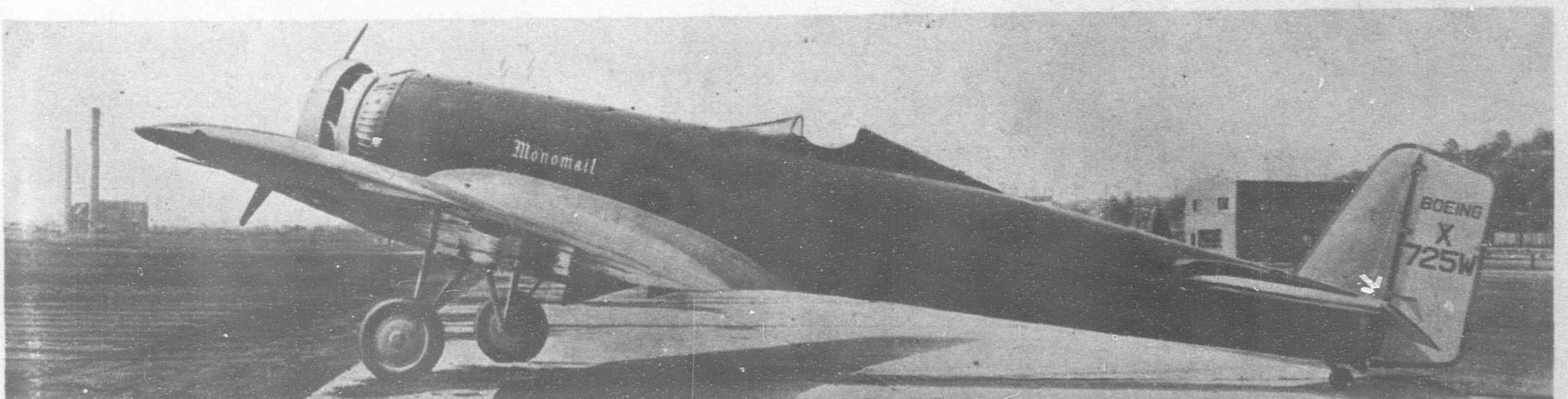
As a combination cargo-passenger ship, the Monomail carries six passengers and 1,100 pounds of cargo or eight passengers and 700 pounds of cargo.

MORE PLANES FOR CHINA; A British aircraft company has obtained orders for 10 Moth 'planes destined for China.

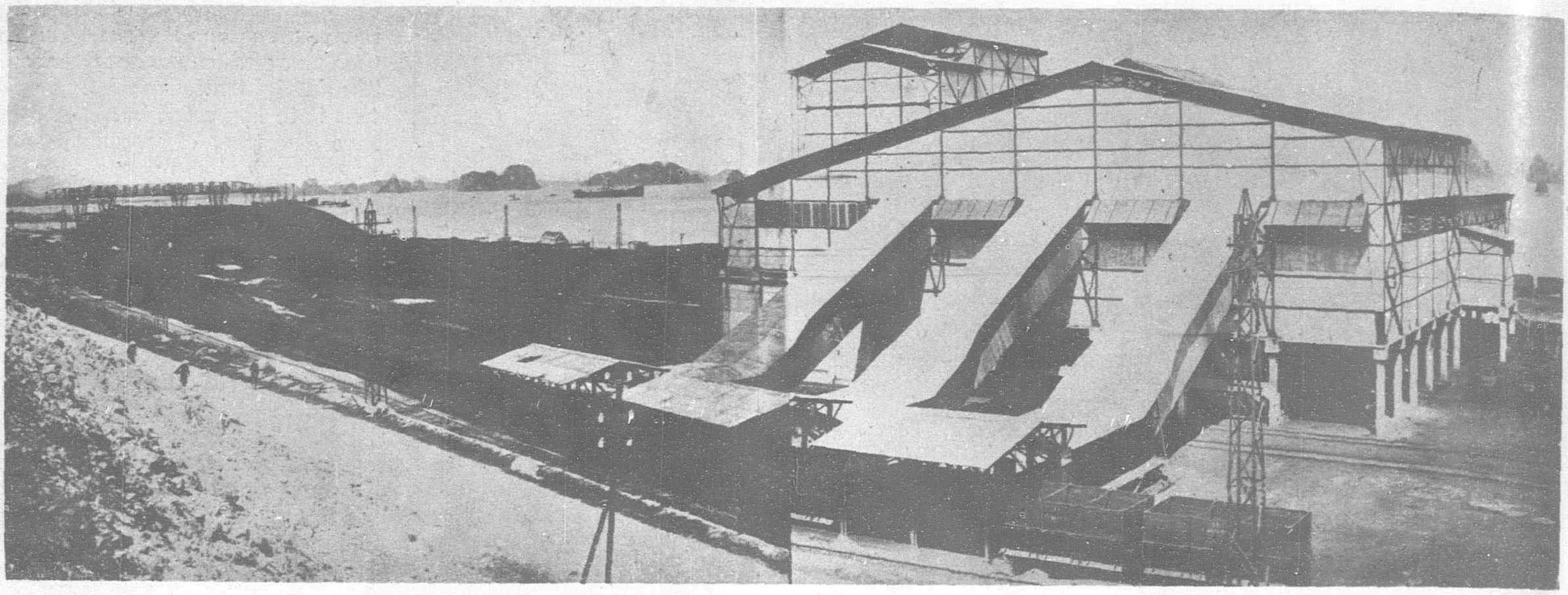
Four of the 'planes will be equipped with interchangeable float undercarriages so that they can be used as seaplanes on the river at Shanghai. A Canton newspaper reports that General Chen Tsai Tong has placed an order for six more bombing 'planes with an American firm in Canton.

These 'planes will be of American make, each equipped with an engine of 600 horse-power.

The total cost will be about $60,000.



New Boeing Monomail Plane



General View of Campha Port Installation of the Societe Francaise des Charbonnages du Tonkin.

The Hongay Coal Mines

of French Indo-China

French Indo-China is becoming every day a more important coal exporter, inasmuch as with the small deposits in Korea and Shantung, she is the principal source of anthracite fuel in the Far East. The deposits are practically all situated in Tonkin, in the vicinity of the picturesque and well known Baie d'Along.

The Chinese in 1865, were the first to work the coal field. European prospectors then came (Fuchs-Saladin in 1882 and Sarran in 1886) and the coal fields of Along Bay were conceded and a Company was formed. For lack of markets the early days were hard, but since 1900 success has been assured to the company working the Mines under the name of "Société Française des Charbonnages du Tonkin." The capital is only fcs. 38,400,000 divided in 153,600 shares of a nominal valve of fcs. 250, which are quoted at the Paris Bourse well over fcs. 7,000 (July 1930). The Head Office is in Paris, 64 Rue de la Chaussée d'Antin and the Directors are Messrs. Henri Thelier (Chairman), Fernand Monvoisin, Christian de Monplanet, Albert Luc, Raymond Ferrant, Fernand Carrere Stanislas Simon, Robert Thoumyre, Henri de Monplanet and Henri Girot. The General Manager is Mr. A. Marcheix, the Commercial Manager Mr. G. Cuvillier (Hongkong), the Technical Manager Mr. Bonnevay (Hongay). There are now employed at the Mines over 300 Europeans, mostly French people, and over 30,000 coolies, practically all Tonkinese.

The Mines are located in Tonkin, in the province of Quang Yen and are situated near Along Bay and Tsi Long Bay, in the extreme north of the Gulf of Tonking. The collieries can be reached *via* Haiphong either by motor car or steamer, the distance being 35 miles. Frequent services of steamers connect Haiphong with Hongkong, Saigon, Singapore.

The mining area extends over 61,700 acres, the full property of the Société Française des Charbonnages de Tonkin, the Principal centers of which are Hongay and Campha.

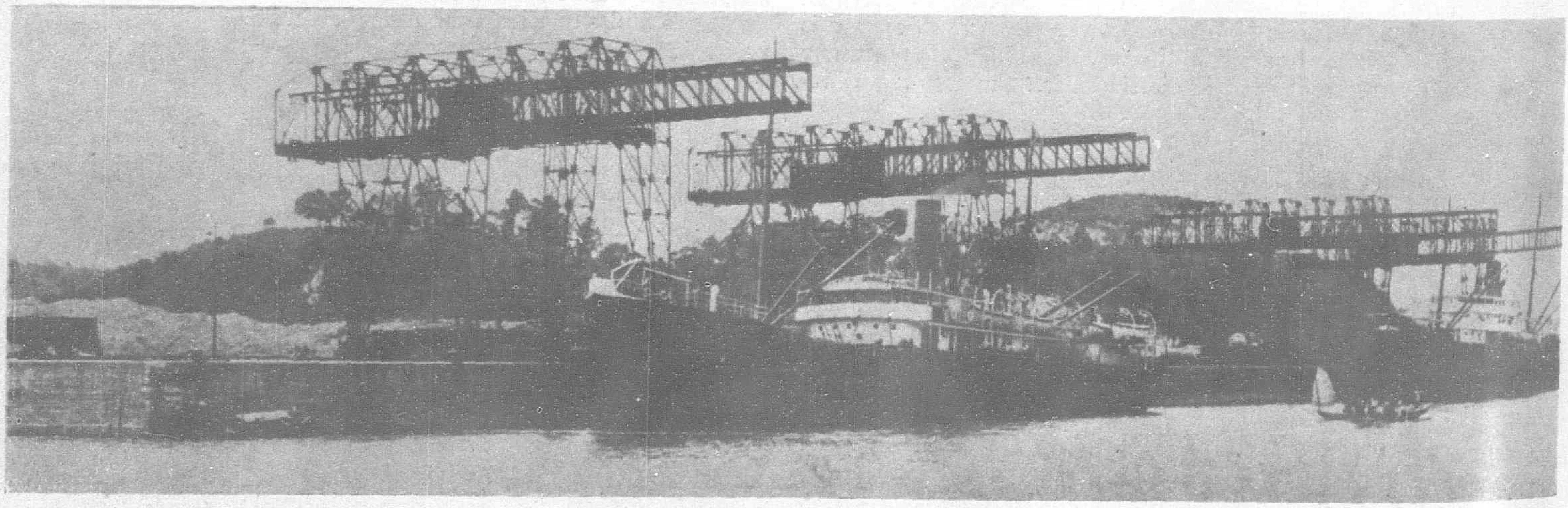
Including merchants, wood cutters, farmers, boat people, etc living on the Company's property, over 60,000 people are under the jurisdiction of the Company.

The output has increased regularly as follows:

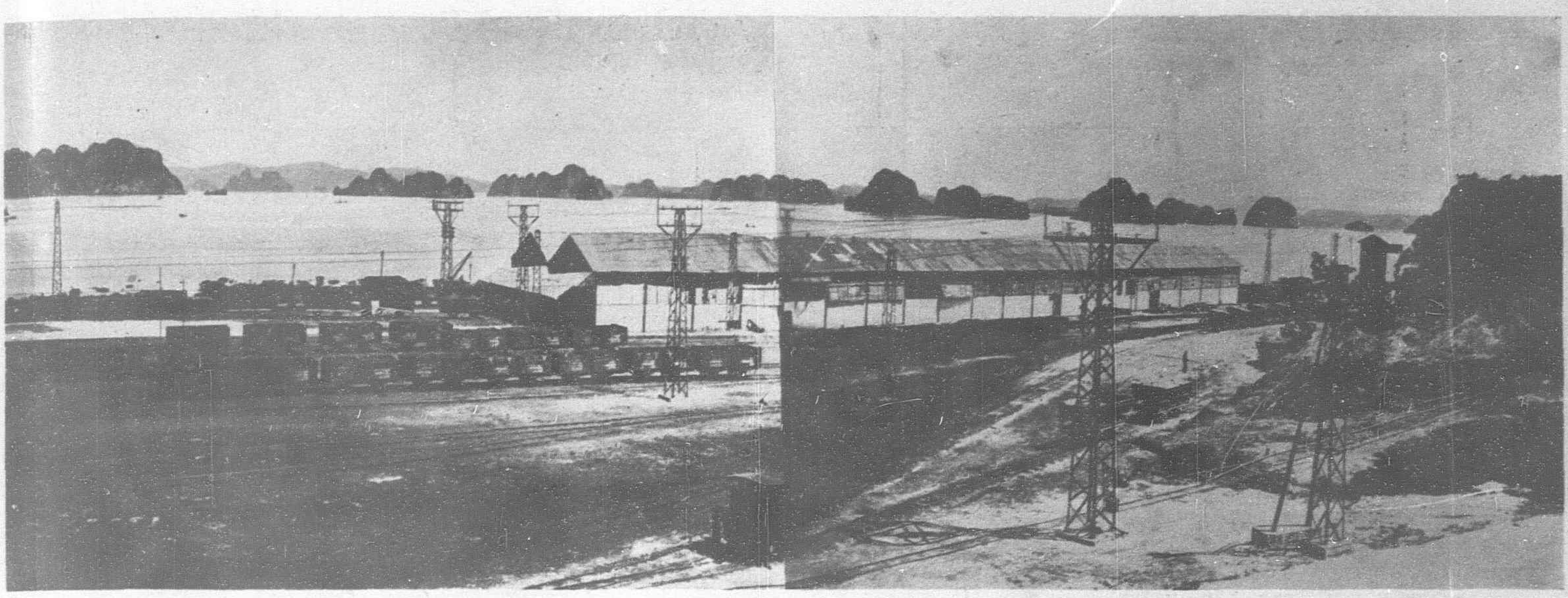
194,441 tons	in 1900
720,000 ,,	1921
1,450,000 ,,	1928

GEOLOGY.—The coal seams of Hongay are of Rhetian formation, resting on an important foundation of calcine, to which belong the rocky islands of the Bay d'Along and Fai-Tsi-Long. The coal is found in a large number of seams of various thicknesses from 16/19 feet to 260 feet.

SHORT DESCRIPTION OF MINING OPERATIONS—Two distinct methods of mining have been developed: the Open Cut and Underground Mining. When the thickness of the upper alluvium



Coal Loading Wharf at Campha Port



In the Center is the Screening and Washing Plant. The Coal Loading Installation is on the Left

ground is not too big in proportion to the thickness of the coal seams, the Open Cut method is used.

In each open cut, the working levels are disposed in a number of straight steps from 16 to 19 feet high, the general incline being maintained at 45° in order to prevent landslides.

The three open cuts of the Hatou area have 20 to 24 such steps whose lengths are from 650 to 980 feet.

The three open cuts of the Campha area extend over a ground of more than 3,300 feet in length and 420 feet high, the working levels being distributed on 26 steps.

At the same time as the seam of coal is being cut one must remove the overlying alluvium ground. One must also remove the numerous shale layers, which are found amidst the coal veins in the seam itself.

The coal and the alluvium ground dug separately are loaded on small cars, rolling on Decauville rails running on each step. These small cars are taken to a convenient level by way of inclined haulage ways. Those loaded with the alluvium ground are directed towards special dumping places, those loaded with coal are directed towards places where the coal is gathered. From these places the coal is loaded into cars of 10/20 tons capacity, which carry it to the screening plant.

THE UNDERGROUND MINING—Is used in other parts where coal seams do not justify the Open Cut method. The seams worked in this way are 16 to 26 feet thick. They are generally worked by horizontal cuts of about six feet. As the cover of the seams is of a non-resistant soil, the galleries, once worked, must be refilled.

SCREENING PLANT—From the Open Cuts or Underground Mines the coal is carried to a screening plant. There are two of them, situated respectively at the two loading ports of Hongay and Campha. An electric railway is running between the Mines and the screening plant at Campha.

These screening plants come from the very well known firms of Dalbouze—Humboldt and Evens-Coppee.

The coal is screened in four classes:

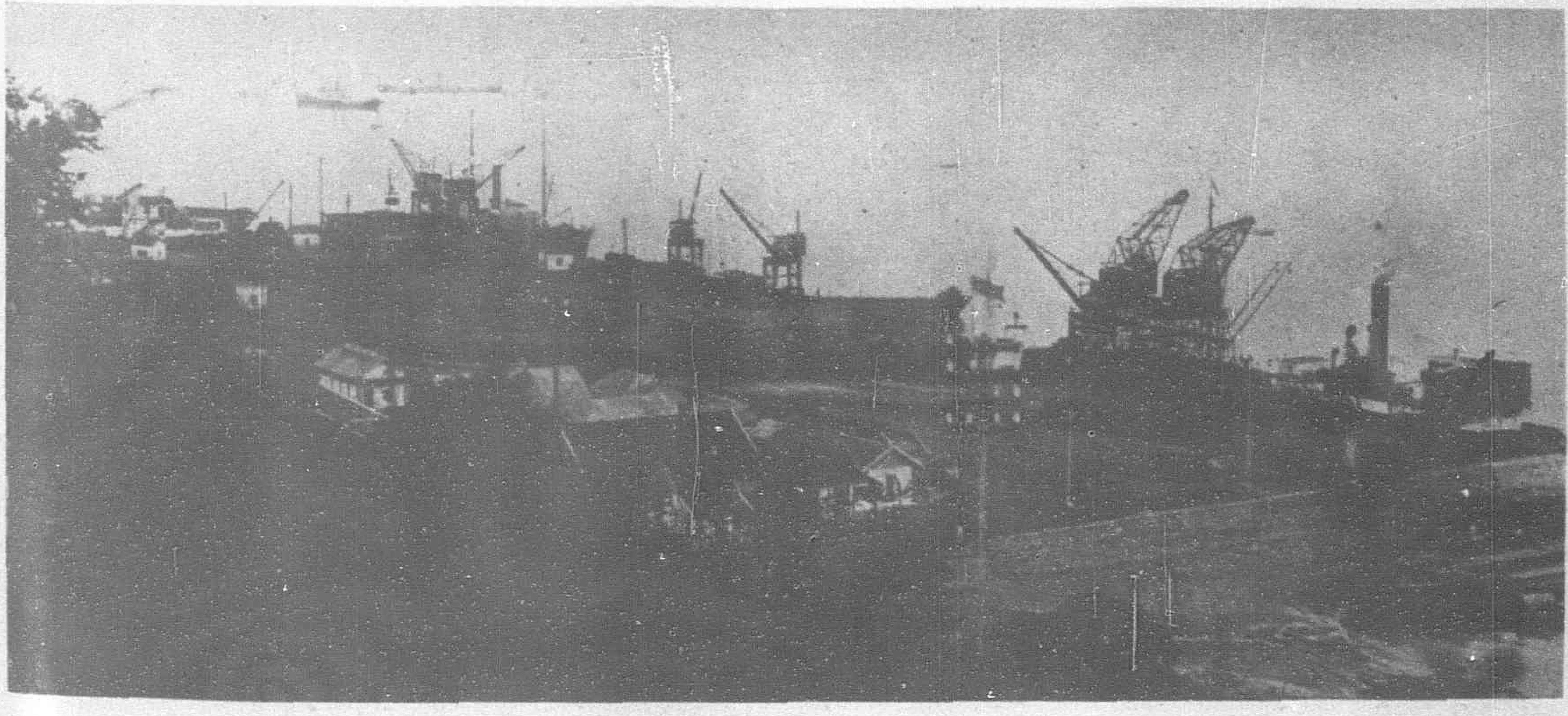
Lump	over 50 m/m		
Small Lump	from 30	,,	to 50 m/m
Nuts	from 6	,,	to 28 m/m
Ordinary dust	from 0	,,	to 30 m/m
Fine dust	from 0	,,	to 10 m/m

The Lump coal and Small Lump coal are sorted on running belts and stones and shales are picked up and thrown away. The nuts are worked through a washing plant, which produces nuts from 6 to 12 m/m and 15 to 28 m/m.

PATENT FUEL FACTORY—The fine dust of the Hongay Coal is mixed in certain proportions with bituminous coal and pitch. Briquettes and eggs are manufactured with this mixture by four Bietrix Leflaive presses and two Middleton presses, the total daily production being 600 tons.

COAL YARDS—From the screening plants and the washing plants, the coal is loaded on cars, which are directed towards a system of tracks running through the stock yards. At Campha Port, the stock yard is half a mile long and equipped with three electric overhead cranes of 131 feet between supports which can either put the coal in stock by lifting and dumping the cars or take it out again from heaps by means of electrically driven coal grabs. They have been specially laid up so as to insure easy and quick movement of cars, haulage being installed everywhere.

SHIPMENTS—The totality of the coal disposed of by the collieries is loaded on steamers or lighters at one of their two ports of Hongay or Port Campha.



The Port and Wharves of Hongay

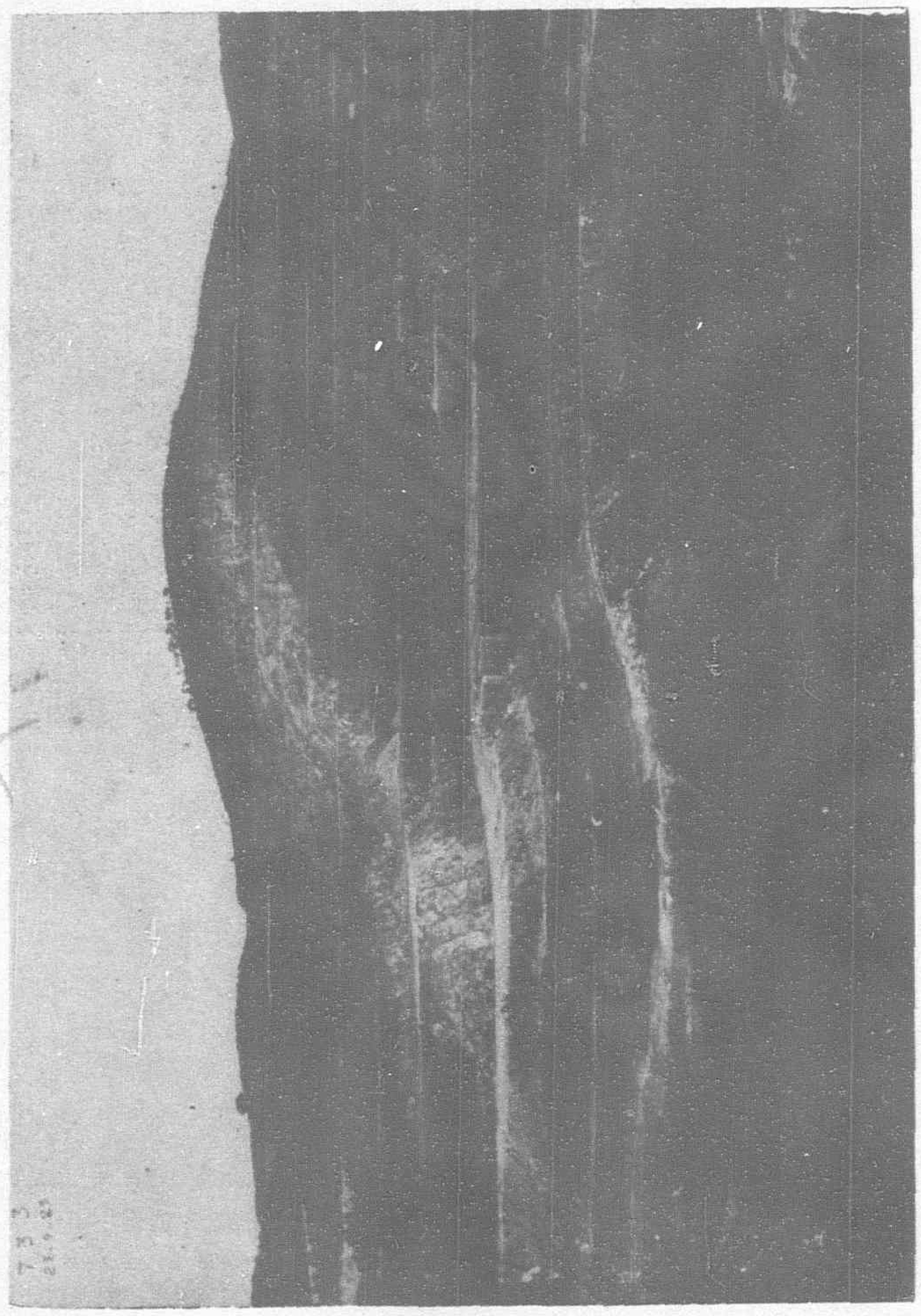
At Hongay there are three quays of 229, 246, and 262 feet respectively. The loading into steamers is done by six cranes of about 80 T. per hour efficiency each. The upper part of the cars shaped as a box is lifted by these cranes, brought over into the hatches of the steamers and overturned.

At Campha Port, the loading pier has a length of 984 feet, and is equipped with four electric driven overhead cranes each of a loading capacity of 120 tons per hour. All cars at Campha are electrically hauled.

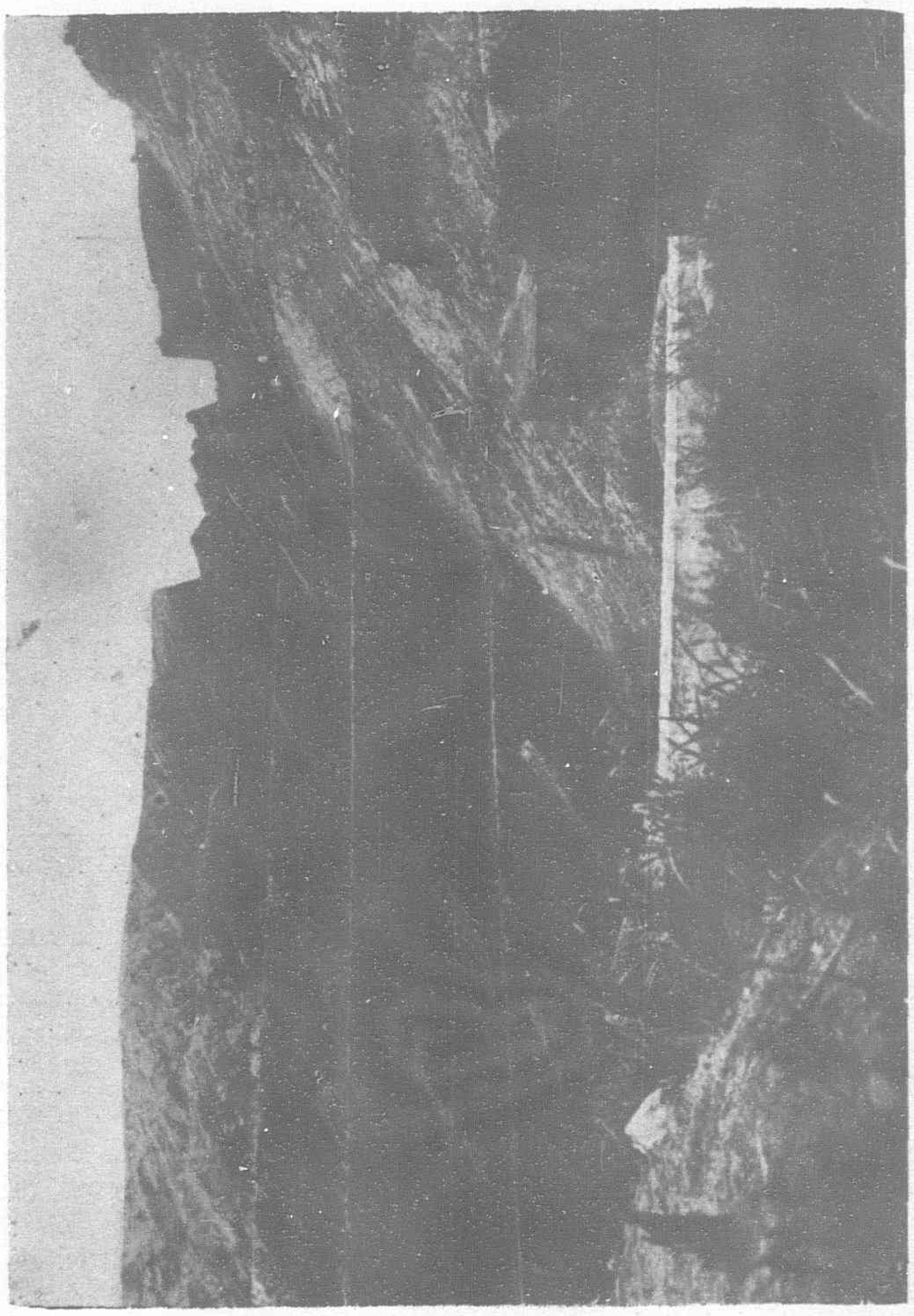
These two ports are accessible at any time to steamers

THE OPEN CUT COAL WORKING AT HONGAY.

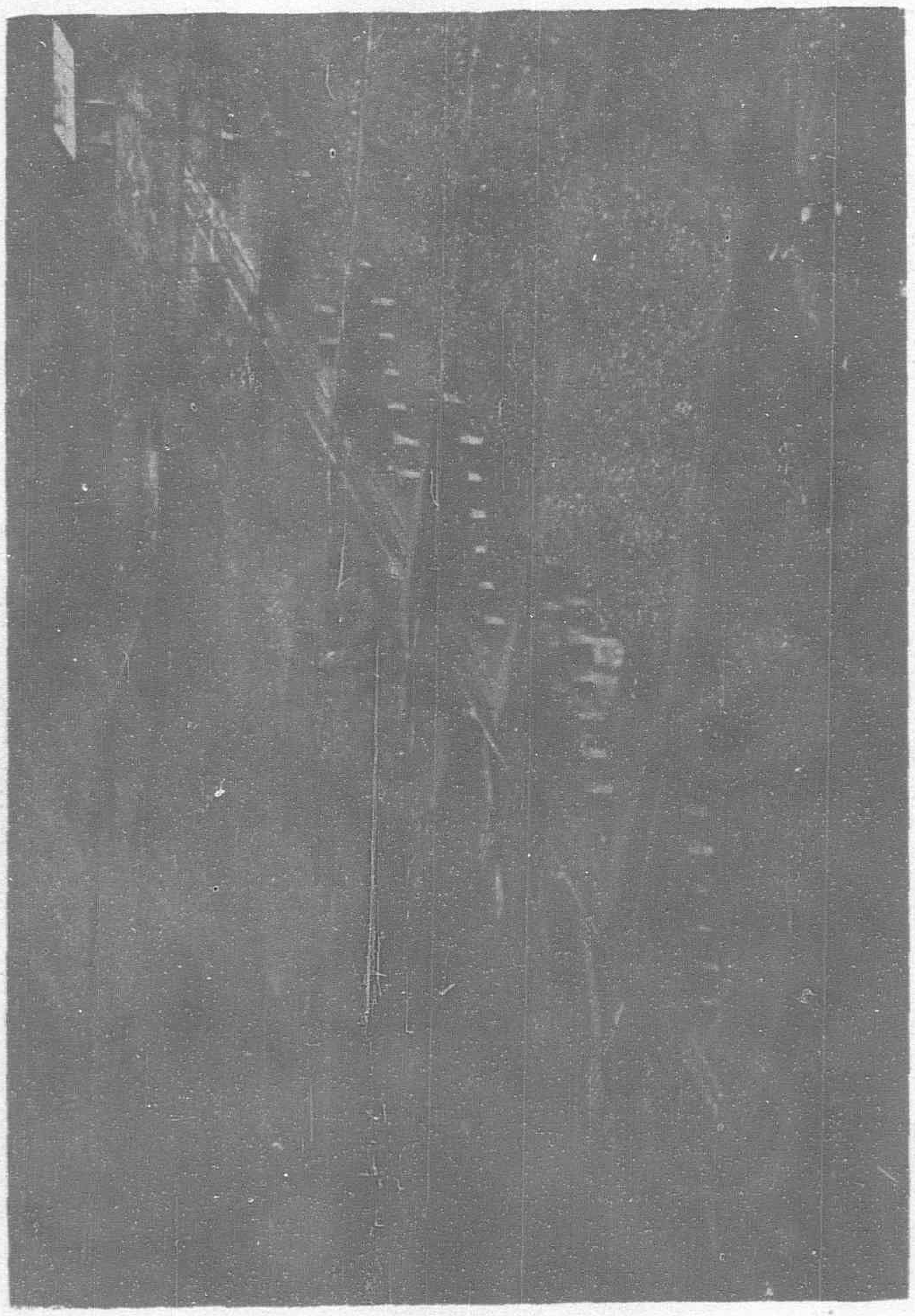
Tonking, Indo-China.



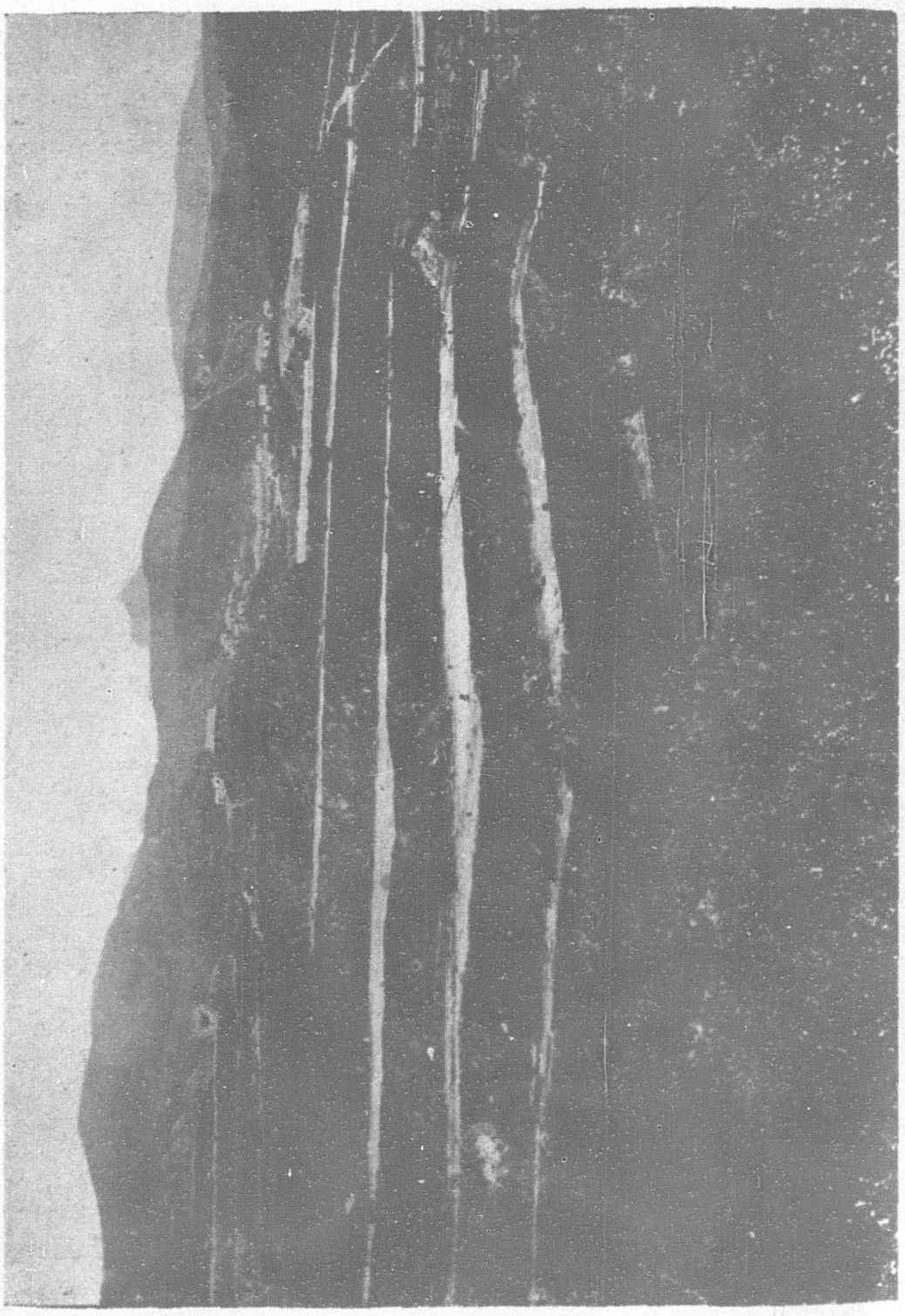
Part of Open Cut



Part of Open Cut Showing Coal View



Part of Open Cut Showing Incline for Haulage of Coal Wagons



Part of Open Cut Showing Direction of Coal Seam (at Halam) of 5,000 to 8,000 tons loading capacity, the depth of water being from 26 to 29 feet.

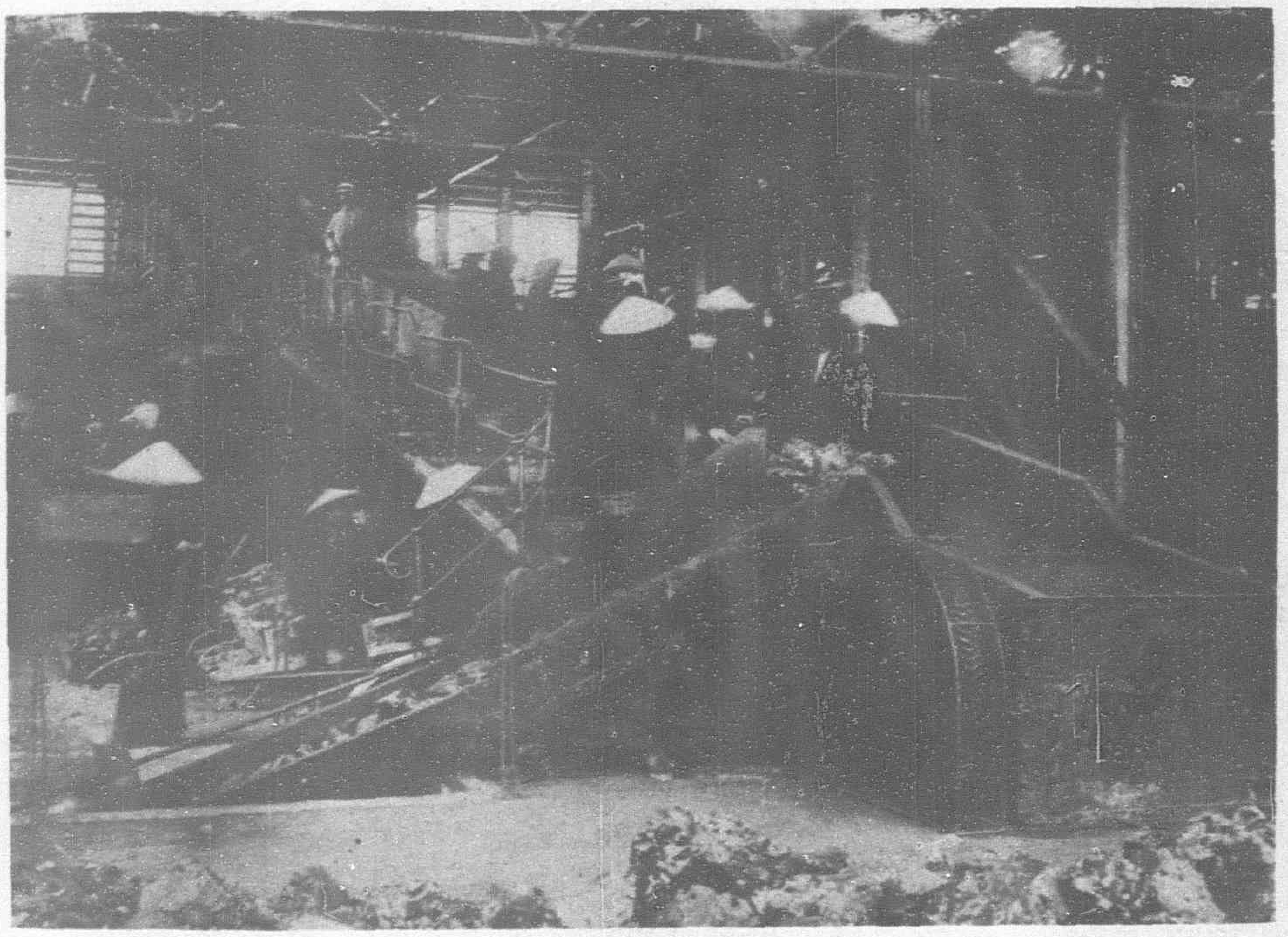
Electric Railways—In addition to the side lines that are worked electically, there is at present a main Track line of seven miles (between Campha Port et Campha Mines). Electric locomotives weighing 30 tons and equipped with four motors of 110 h.p., 750 volts, haul trains of 300 tons at a speed of 22 miles per hour.

Cars are " automatic side dumpers " each of 10 tons effective capacity.

Power Plant—In order to comply with the electricity requirements of the mines the Sté. des Charbonnages du Tonkin, has built a Central Power station of 4,000 kw., which will soon be increased to 8,000 kwt.

This Power station, entirely of concrete, is equipped with four turbo-alternators of the Sté. Alsacienne de Constructions Mécaniques of Belfort, operating at 3,000 revolutions per minute. Steam is produced by seven Babcock and Wilcox boilers each of 2,359 sq. feet, heating area with automatic grates and superheaters.

Screening and Washing Plant at Campha



Inside View of Screening Plant, Picking Out Stones and Shale

The alternators produce 3,000 volts triphase current which is raised by transformers up to 30,000 volts, tension of transportation all over the Mines.

In three sub-stations, the current is reduced to 3,000 volts. At places of consumption other transformers step down the current to 110 volts. All units have been especially designed with interchangeable parts.

Continuous 750 volts current is supplied to the main railway track by a special sub-station situated at Campha port.

Social Amenities—The Company has built for their native workmen residents or not, many villages on most modern plans, besides improving the old ones. In all of these localities the latest system of drains and water distribution have been established. The public health is much cared for and important works are continually made for its improvement. Much attention has been paid to public buildings such as markets etc. Three hospitals accommodating 400 beds are kept by the Company with corresponding medical service. Churches, schools, sport grounds, clubs have been erected by the Company.

Quality of Hongay Coal

General Properties—Hongay Coal is an anthracitous fuel which contains a high percentage of fixed carbon and low percentage of volatile matter. The ash is infusible at the temperature of boiler furnaces, does not leave any clinkers, and does not choke up the grates. Its low percentage of sulphur as well as its high percentage of fixed carbon specially recommends it for metallurgical purposes. The grates; pipes, boiler tubes and boiler surfaces do not corrode. Hongay coal burns entirely and without smoke, and can be easily compared to the best lean short flame anthracitous Welsh coal. Its very high calorific power is taken advantage of to increase the efficiency of coals with which it may be mixed. Hongay coal is most suitable for furnaces, household and any purpose, and is used at its best in the various kinds of furnaces fitted with appliances for the production of forced draught.

The "Hotel des Mines" at Hongay

CLASSIFICATION OF HONGAY COALS—

Lump	over 50 m/m	(over 2″)
Small Lump	30 m/m to 50 m/m	(1 1/4″ to 2″)
Nuts: large nuts	15 ,, 28	(1/2″ to 1″)
Nuts: small nuts	10 ,, 18	(2/5″ to 3/4″)
(washed) very small nuts (peas)	6 ,, 12	(1/4″ to 1/2″)
Ordinary Dust	0 ,, 30	(under 1″)
Fine Dust	0 ,, 10	(under 2/5″)
Run of Mine	Mixture of equal quantities of lumps over 30 m/m (1 1/4″) and ordinary dust.	
Patent fuel.	naval briquettes marine briquettes kitchen briquettes bituminous eggs No. 1 anthracitous eggs ,, 2 kitchen eggs ,, 3	consisting of various mixtures of Hongay coal, bituminous coal, and pitch.

LUMP AND SMALL LUMP.—

Lump

Average size about 100 m/m (about 4″)	Volatile Matters	8 to	10%
	Ash	3 ,,	5%
	Fixed Carbon	85 ,,	87%
	Sulphur		0.4%
	Calorific Power	7500 ,,	7700 cal. (B. T. U. 13500) (to 13850)

Small Lump

30 to 50 m/m (1 1/4 to 2″)	Volatile Matters	8 to	10%
	Ash	4 ,,	8%
	Fixed Carbon	82 ,,	88%
	Sulphur		0.4%
	Calorific power	7400 ,,	7600 Cal. (B. T. U. 13320 (to 13700)

This Coal is specially suitable for domestic heating purposes and for boilers. It is well adapted to the types of boilers with forced draughts, and the merchant service is its principal consumer. It is equally well adapted to boilers with natural draught, but preferably when mixed with bituminous coal. A large part of the output in lump and small lump coal is absorbed by household uses. For this latter purpose, small lump is better as it needs no breaking before use.

NUTS—All the different kinds of Hongay Nuts are washed, so that they are particularly clean products.

Analysis	Volatile Matters	8 to	10%
	Ash	4 ,,	7%
	Fixed Carbon	83 ,,	88%
	Sulphur		0.4%
	Calorific power	7600 ,,	7800 Cal. (13700 to 14000 B. T. U.)

Their uses are specially adapted to gas producing plants for which all fear of continual stops is then eliminated. The large nuts are used for steamers and the boilers of many factories. They do not require special grates. It is only necessary to create an adequate forced draught which should be stronger of course when small nuts are used.

ORDINARY DUST—

Volatile Matters	8 to	9%
Ash	7 ,,	10%
Fixed Carbon	80 ,,	85%
Sulphur		0.4%
Calorific power	7300 ,,	7600 Cal. (13200 to 13-700 B. T. U.)

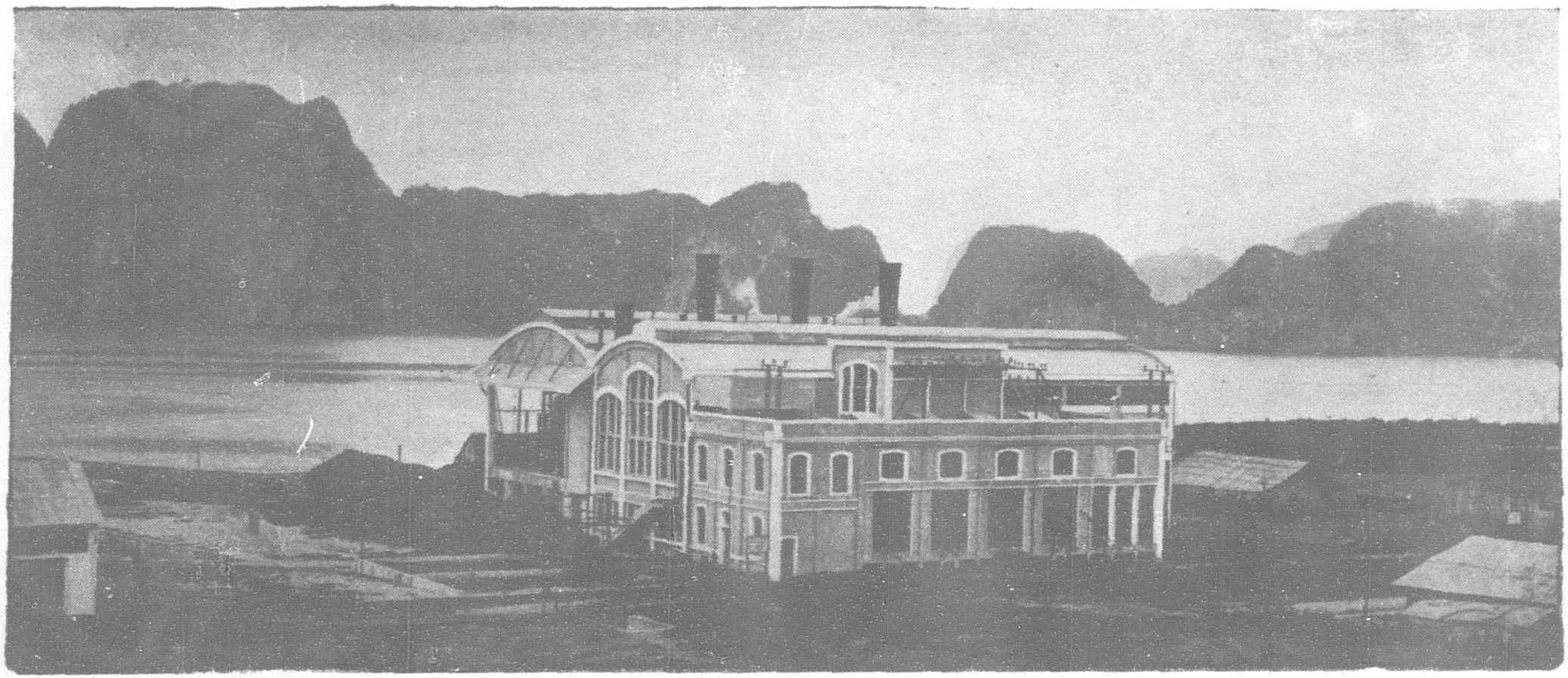
Hongay Dust is used for very many purposes such as for reducing ores. It is in great demand in cement works, and refineries use it in their ovens. In China, it is used in the manufacture of lime, distillation of native alcohol, and as a kitchen fuel when mixed with clay and made into balls.

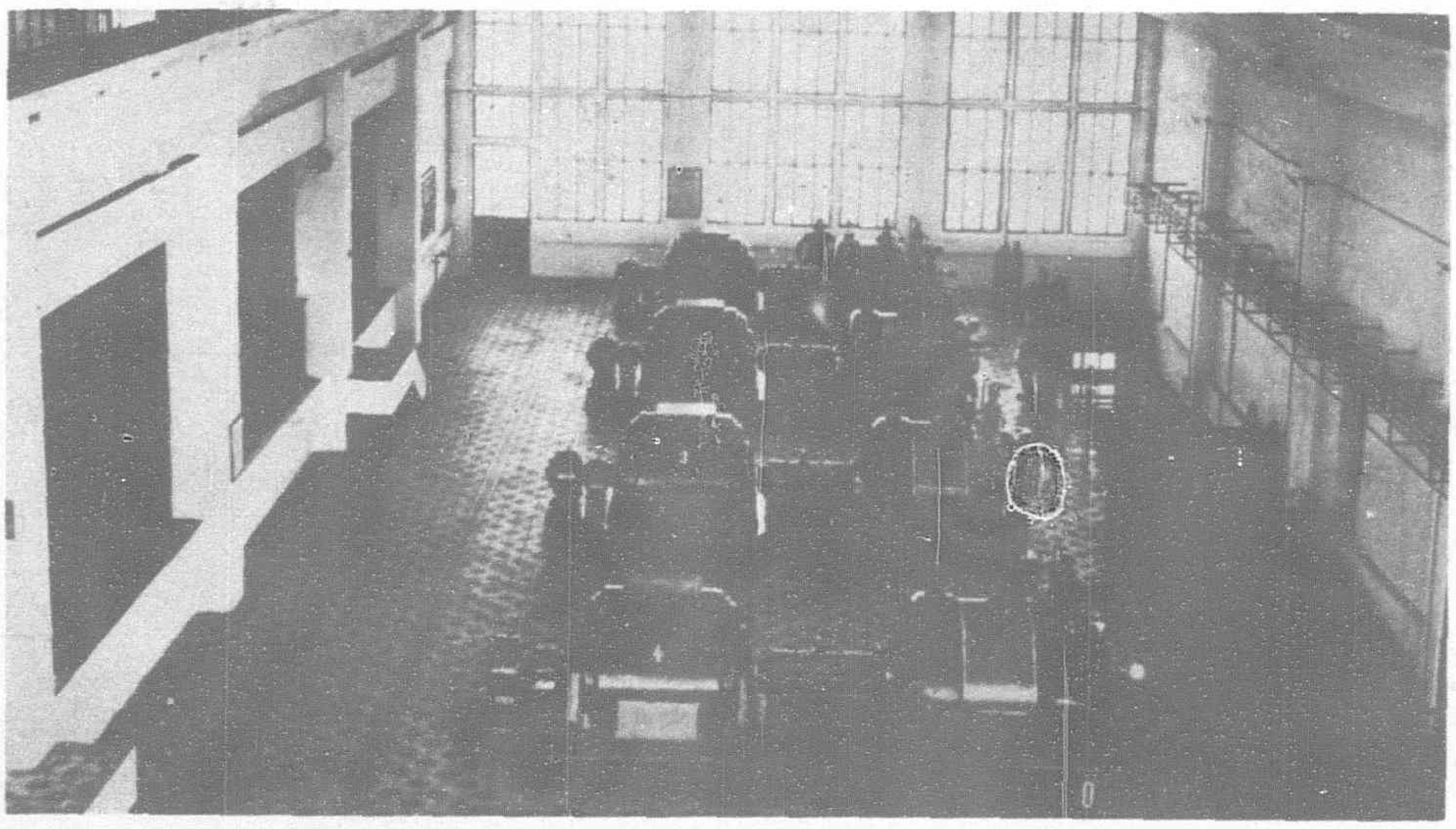
FINE DUST—(0.10 m/m). It has the same composition and properties as Ordinary Dust with a somewhat lower percentage of ash. It is suitable for the same uses.

It is not very much used for boilers, but forms the main fuel of iron works, cement works, sugar refineries, etc. . .

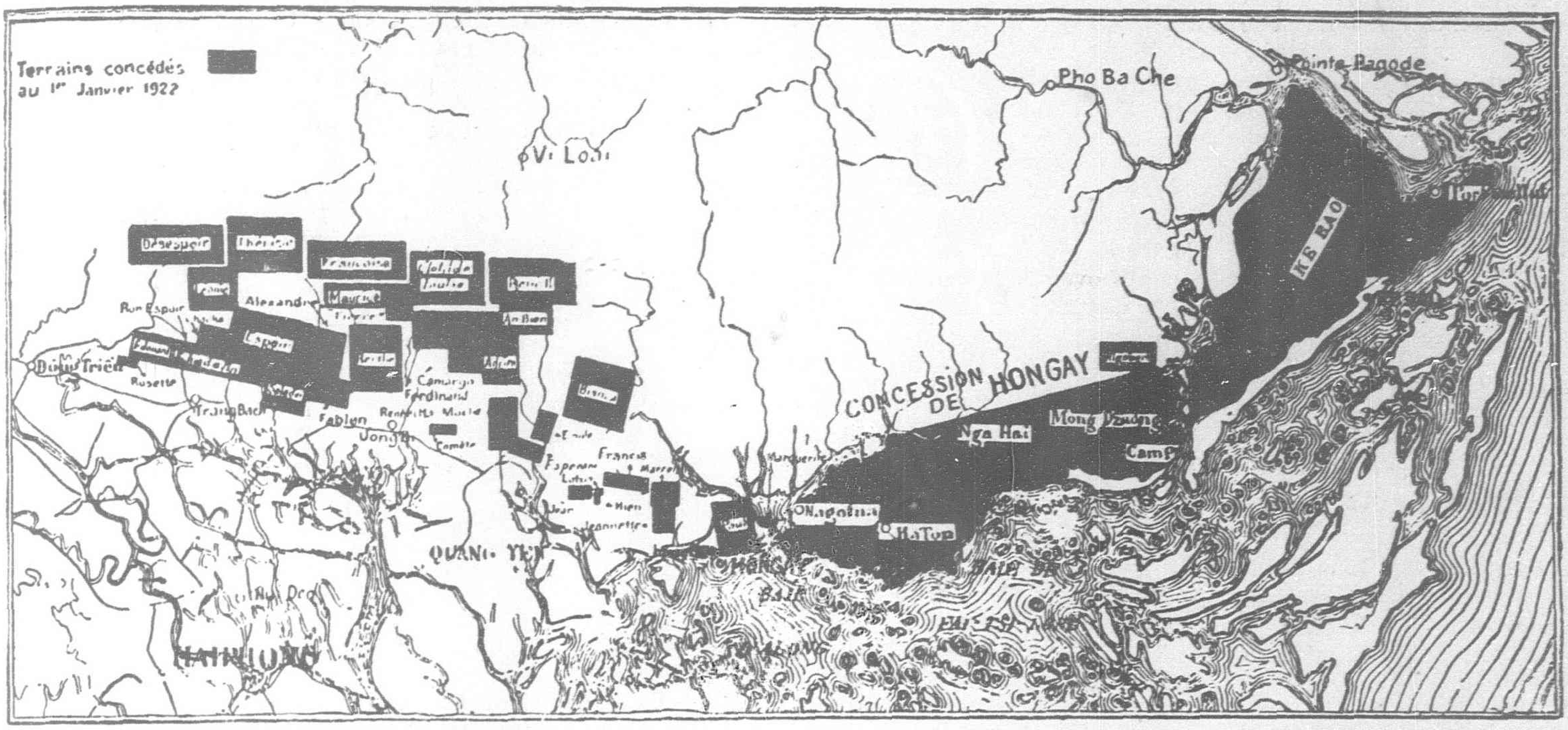
RUN OF MINE—(Mixture of Lump and small Lump (50%) and Ordinary Dust.) The Run of Mine when shipped does not come directly from the Mines; it is reconstituted after the screening process in which it has been sieved and freed from inert matter.

It is in all respects the best fuel on the market when mixed in the right proportions with bituminous Run of Mine (2/3 Hongay Run of Mine and 1/3 bituminous Run of Mine, for instance).

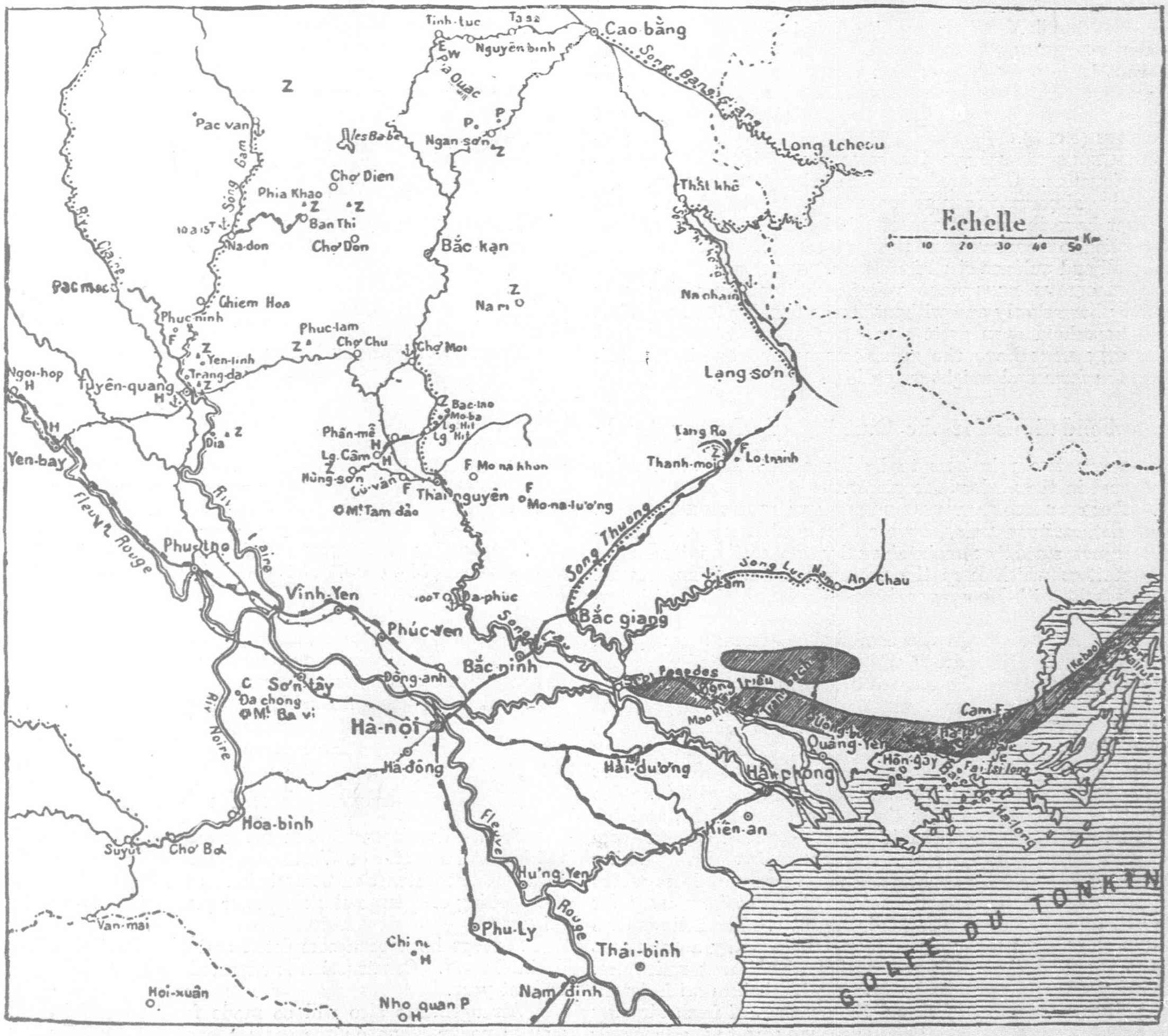




Exterior and Interior Views of the Hongay Mines Power Station



Coal Deposits on the Bay d'Along, Indo-China, Showing the Hongay Concession and Campha Port



Map Showing Principle Mineral Deposits of Tonking. The Shaded Portion Shows the Coal Areas of the Hongay District and its Relation to Haiphong

The mixture has a much higher calorific power than bituminous coal, it does not soil the grates and can be used for all boilers with or without fans. Its use is rapidly developing in the merchant service; the principal shipowners of Hongkong and the coastwise traffic use it.

BRIQUETTES—The Société Française des Charbonnages du Tonkin produce three qualities of briquettes : the " naval " quality specially used by the Navy, the " Marine " and the " Kitchen " quality.

Naval Briquettes	*Analysis*
Volatile Matters	18 to 19%
Ash	6 ,, 7%
Fixed Carbon	74 ,, 76%
Sulphur	0.75%
Calorific power	7800 ,, 8000 Cal. (14040 to 14500 B.T.U.)

They produce 8.400 Kgs to 12 Kgs of steam in a boiler having an efficiency of 72.67%.

Marine Briquettes	*Analysis*
Volatile Matters	18 to 19%
Ash	7.50 ,, 8.5%
Fixed Carbon	73 ,, 75%
Sulphur	— —
Calorific power	7600 ,, 7700 Cal. (13700 to 13850 B.T.U.)

Hongay briquettes are well-known throughout the Far-East, they are the main fuel of the principal French shipping Companies of Indo-China, the Railways of Indo-China, and the French fleet in Far-Eastern waters. They weigh about 6 Kgs (13 lbs) and are very easy to handle.

KITCHEN BRIQUETTES are very similar to the marine briquettes but have a large percentage of ash. They have the same uses.

The Hongay Coal Company manufactures also three qualities of egg coal : bituminous eggs (No. 1), anthracitous eggs (No. 2) and kitchen eggs (No. 3).

BITUMINOUS EGGS have the same composition and use as marine briquettes. Compared with the briquettes they have the disadvantage of occupying more room in the bunkers for an equal weight, but have the advantage of eliminating loss by breakage when supplied to the furnace and the fire is easier to build on account of the small and uniform size of the eggs.

ANTHRACITOUS EGGS have volatile matters averaging only 14% ; they burn slowly and without smoke forming thus a perfect fuel for household open grate fires.

KITCHEN EGGS have the same composition as kitchen briquettes ; the form and weight only differ.

Recommendations for the Burning of Hongay Coal

There are two principles to be borne in mind when using Hongay coal in the various fire places.

1.—THE FIRE MUST ALWAYS BE KEPT AT A HIGH TEMPERATURE. With all anthracitous coals, above all those of Hongay, the combustion is not stated or maintained by the easily inflammable volatile matters which keep the fire at a suitable temperature. The best results with Hongay coal can only be obtained with furnaces having a very large heating area directly subjected to the radiaton of the fire. When the combustion becomes less active, the pressure in the boilers drops, whilst it is exaggerated when one has to open the doors of the furnace to work the fire, this putting the large heating surface in contact with cold air. Every time Hongay coal has not been found satisfactory, it has been due to the fact that combustion has been allowed to dwindle through lack of attention. When there is no forced draught the *thickness of the fire on the grate should remain between 6-in. and 8-in.* The fuel must be uniformly spread ; the fire must be bright, and the flame clear. If the flame is reddish, then there is too much coal and the combustion is too slow. The formation of very shiny patches must be carefully avoided because these are places where the layer of coal is too thin and where exists an easier passage for the draught than in the other parts of the grates. The hollows thus formed in the layer usually soon become replaced by a dark area owing to the cold air which passes through without resistance. This phenomenon is more to be feared with boilers with forced draught than natural draught, and the currents of fresh air may cause contractions of the metal and eventually up to the breaking of the boiler tubes.

The gist of the matter is : that whether with natural or forced draught, the fire must be kept at a high temperature and the best way to do this is to have at all times a uniform layer of fuel on the grates.

2.—It has been said that the ash of Hongay coal does not corrode the grate bars or forms scales or clinkers. Therefore, it is unnecessary to poke the fire as is usually done by drawing the poker underneath the coal and raking the fuel to the sides to scratch the spaces between the bars. It is indeed a very bad practice.

Most coals become slightly softened when they are burning redhot. This gives a certain cohesion to the burning mass when it is poked and sometimes one may stir layers of bituminous coal for a long time without causing any cinders to fall through the bars in any appreciable quantity. Hongay coals, however, do not soften and on being poked they break with the result that a large quantity of half-burnt cinders pass through the bars.

When from appearance of the furnace one guess that there is a little ash under the burning coal, it is quite enough, *without opening the door of the furnace*, to slip the poker under the grate, with its point turned upwards, and to lightly shake the bottom of the burning layer.

Conclusions

1—The door of the furnace should be opened as seldom as possible.

2—The layer of burning coal must be kept even and not more than six to eight inches thick.

3—Once the fire has been well supplied with fuel, the burning part should be touched as seldom as possible.

These are essential conditions for the best utilization of Hongay coal which will then burn in any fireplace with a large grate area to the complete satisfaction of the consumers.

PRODUCTION OF THE HONGAY MINES—

1900 —	194,441	1926 —	855,000
1916 —	575,600	1927 —	1,030,000
1921 —	720,000	1928 —	1,450,000
1922 —	760,000		

DISTRIBUTION OF SALES OF HONGAY MINES

	1925	1926	1927	1928
French Indo-China	291,000	307,000	296,000	288,000
Bunkers	33,000	62,000	68,500	70,000
Exports	373,000	530,000	687,000	789,000

EXPORTS OF HONGAY MINES

	1925	1926	1927	1928
China Central	53,000	107,500	133,000	197,000
China South	34,000	55,000	77,000	98,500
Japan	182,000	236,000	334,000	365,000
Others	5,000	6,500	4,500	8,000
	373,000	530,500	687,000	789,000

The quality of Hongay coal is one of the best in the world amongst coal of its class. It is certainly the best of its kind in the Far East.

A certain number of years have been taken for preparing the equipment of the mines, and the production has been kept low. The last development of the production shows that these collieries have now resolutely started a considerable expansion, which will soon rank them amongst the biggest mines of the Far East.

Power Plant for Wusih

For the development of manufacturing enterprises in Kiangsu, the industrial center of Wusih was selected some time ago by the National Reconstruction Commission as the most suitable place for the opening of a large electric power generating plant in southern Kiangsu.

Surveys have been completed and the location of the works decided upon. Construction is expected to be started within the current year.

Arrangements also will be made for the establishment of a similar power plant on the eastern shore of the Hung-tse Lake in northern Kiangsu.

Conservancy Works in China

(*Continued from page 497*).

handicap of Shanghai is that the Yangtze Channel is only 40 miles, while that of Hangchow Bay 60 miles, and steamers can not enter the Whangpoo in the winter when water is low, which is usually 17 feet. To facilitate water transportation between the proposed Hangchow port and various points in the interior, it is proposed to dig a canal connecting the proposed port with Wuhu, in Anhwei province and Yi-hsin in Kiangsu Province.

The construction work will be divided into three periods. The first period will be devoted to surveying and preliminary preparations. The expenses for this period will total about $1,200,000. Actual construction will be done in the latter two periods. About $20,700,000 will be spent in the second period. This sum includes $5,000,000 for the construction of a breakwater, $2,000,000 for warehouses and docks, $2,000,000 for the building of a railway connecting the proposed Great Eastern Harbor with Chia-shih on the Shanghai-Hangchow-Ningpo Railway, $4,000,000 for the construction of a canal running from the proposed port to Wuhu, $500,000 for a power plant and about $250,000 for water works. Approximately $44,150,000 will be needed to complete the program outlined for the final period.

3. *The Great Northern Port.*—The Great Northern Port is on Phai Bay, between Taku and Chingwangtao, where the Taching River flows into the sea. Although Tientsin is at present the principal port in the north, owing to the shallowness of the Pei Ho, most of the coastal steamers have to anchor off Tangku near the mouth of the river about 50 miles from Tientsin, and handle cargo to and from lighters. According to the investigation of experts, the channel can be easily dredged to a depth of 30 feet. The port is frozen in the winter for two months, however according to the experts that with the construction of breakwater and with the aid of ice-breakers, the port can be kept ice-free at all times of the year.

The Reconstruction Commission has worked out the necessary amount of capital for such an undertaking. It is reported that $57,700,000 be used for the construction of this Great Northern Port. The construction will be divided into three periods of five years each, and it will take $3,900,000 every year for fifteen years to complete the project ; $22,000,000 in the first period, $18,200,000 for the second period, and $17,500,000 for the third period. It is also estimated that as soon as the first period is completed the port will be able to derive revenues sufficient to pay the expenses in the second and third periods. It needs only $22,000,000 to start the work of the first period and then the entire program can be carried out from revenues.

As to the source of the funds for the Great Northern Port and the Great Eastern Port, the National Government has decided to appropriate the entire amount of the refund of the Netherlands Boxer-Indemnity Funds. It is evident that the Netherlands Boxer-Indemnity Funds is not sufficient for such two gigantic projects. It is proposed that (1) the National Government be urged to set aside a certain amount of money every year for this purpose, (2) $40,000,000 worth of government bonds be floated, and (3) negotiations be started with an American banking group for a loan. It is believed that enough funds may be raised from these sources. The Hulutao construction work has been started with funds available on hand. It is hoped that the construction work of the Great Northern Port and the Great Eastern Port will not be unnecessarily delayed for the opening of these ports to foreign and domestic trade will undoubtedly benefit not only those places in their immediate neighborhood, but all parts of China.

B.—Conservancy Works

Conservancy works done in the year can be enumerated as follows :

1. Plans and estimates for the improvement of the Haiho.
2. Grand scheme for the improvement of the Yung Ting Ho.
3. Plans and estimates for the closing of the dyke breaches of the Yung Ting Ho.
4. Plans and estimates for the improvement of the Grand Canal between Peiping and Tientsin.
5. Plans and estimates for the proposed escape channel from Tu Liu to sea for the relief of flood waters of the Yung Ting Ho, Ta Chiang Ho and Tse Ya Ho.
6. Plans and estimates for the improvement of Chien Kan Ho and Chi Yun Ho.
7. Plans for the improvement of Woosung Kiang.
8. Plans for the improvement of Hsu Kiang.
9. Plans for the improvement of the Grand Canal between Chekiang and Changchow.

C.—Collection and Compilation of Conservancy Data

1. Files and maps from defunct conservancy institutions :
    - (*a*) Those from the conservancy Department of the defunct Ministry of Agriculture and Labor at Peiping.
    - (*b*) Those from the defunct National Conservancy Bureau at Peiping.
    - (*c*) Those from the defunct Huai River Surveying Office at Ching Kiang Pu.
    - (*d*) Those from the former Anhwei Conservancy Bureau.
    - (*e*) Military maps for the provinces of Kiangsu, Anhwei, Chekiang, etc.
2. Compilation of data on the Huai River.
3. Rainfall data.
4. Data on irrigation.

It is evident that all these activities are only preliminary to a gigantic reconstruction work along conservancy lines. Whether these works can be carried out or not, no one is in a position to predict in view of the continuous civil war in this country. However, all these show at least one point, that is, Chinese nation as a whole are at present keenly interested in the control of nature by scientific engineering works. This is certainly one of the necessary steps for the uplifting of China from chaos.

Coal Mines at Heigan, Heilungkiang

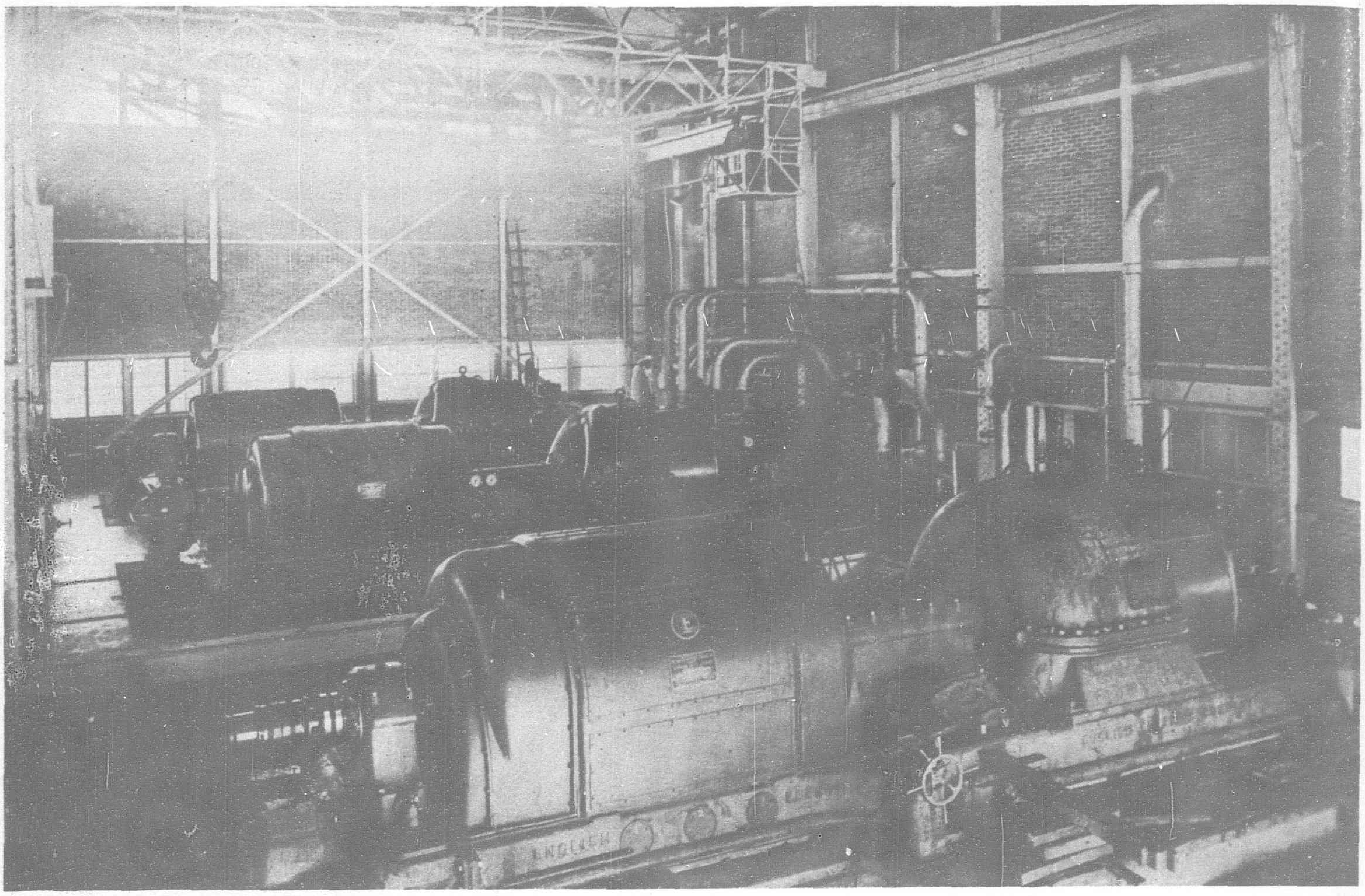
The Heigan coal mines are situated on the left bank of the Sungari river, in Heilungkiang province, about 400 kilometres from Harbin, and 68 kilometres from Liangchiangkou. Their area covers six square kilometres, and rich deposits of coal are found at six places, estimated at over 150 million tons, of which about 600,000 tons represent industrial coal.

The coal obtained from these mines is of high quality, the upper stratum giving the best coal free from foreign matters. When burned it gives little smoke and ashes, and the coke it produces is also of good quality. The middle stratum gives more smoke when burned and its coke is of inferior quality. The lowest stratum emits much smoke and yields almost no coke.

The mines in the district all belong to a Chinese joint stock company called Heigan Mei Kwang Kong Sze with a capital of eight million Harbin dollars, of which five million dollars were spent on the construction of a light railway from the coal mines to the river port Liangchiangkou. The length of the railway is 69 kilometres, having stations at Botsiho, Heiganchien, Heiliho, Chungtehtung, and Hsinshan-chien. There are four railway tracks in the coal mines for inter-transportation. The rolling stock of the light railway includes seven locomotives and a number of gondola cars, each having a capacity for 16.5 tons. Besides freight wagons there are also one second class passenger coach and two third class coaches.

The output of coal of the mines is increasing year by year. In 1926 the output amounted to 2,000 tons and in 1927 it increased to 50,000 tons. In 1928 a further increase of 20,000 tons was recorded over that of the preceding year, the figure for 1929 being not yet available. Of the total output of 50,000 tons of coal 20,000 tons were exported to Harbin, the remainder being sold to steamship companies along the Sungari River.

The mines are worked by the open cut system, the soil stratum above the coal being from three to six sazhens or 20 to 40 feet deep. There are about 1,000 workmen employed in the mines. The mined coal is removed to the waiting gondola wagons in big baskets. The long distance between the coal mines at Heigan and the marketing centers like Harbin constitutes the chief deterrent to the development of the mines. The transport facilities between Heigan and Harbin are available only during the warm season when the Sungari river is ice-free. In order to better develop the mining enterprise, the Chinese corporation is seriously considering the building of a railway from Heigan direct to Harbin.



Perak River Hydro-Electric Company's Malim Nawar Steam Power Station: Generating Room Equipped with Three English Electric 6,000 k.w. Turbo-Alternators

Perak River Hydro-Electric Power Scheme

By A. D. FOSTER, M.Sc.,A.M.I.E.E.

[*In last month's issue of "The Far Eastern Review" appeared a general summary of the Perak River Hydro-Electric Power Scheme from the official data circulated in connection with the formal opening of the Cherendoh Dam. Other brief descriptions dealing with special departments of the work, have been published in earlier issues of this magazine. The enterprise, however, being the largest colonial hydro-electric scheme in existence, representative of the best British engineering practice is of immense importance and possesses many novel features of engineering interest at a time when the development of power stations and systems are occupying the attention of experts in other parts of Asia. We are glad to reproduce the following paper on this scheme, written by Mr. A. D. Foster, who was closely connected with the engineering work as second in charge.*]

AMONG the Federated Malay States, Perak is one of the foremost in the production of tin, and it was with a view to supplying its numerous tin mines with power that the Perak River Hydro-Electric Power Company was formed in 1926. This State is watered solely by the Perak River and its tributaries, chief among which is the Kinta River which joins the Perak some thirty miles from its mouth. It is in the valley of the Kinta River that the principal deposits of tin are found, but as this river is too small for power development on a large scale, the Perak River, which has a considerable discharge, has been utilized and the power transmitted to the Kinta Valley. The valleys of the two rivers run parallel for some considerable distance, separated by a range of mountains rising to 4,000 feet. A site suitable for power generation has been found at Chenderoh, some 18 miles north of Kuala Kangsar, where the flow of the river, based on ten years' observations, are as follows :

Discharge during	12	months	...	2,200	cusecs
,, ,,	11½	,,	...	3,000	,,
,, ,,	11	,,	...	3,400	,,
,, ,,	10	,,	...	4,000	,,
,, ,,	9	,,	...	4,400	,,
,, ,,	6	,,	...	6,100	,,

Catchment area above this point, 2,350 square miles.

The river is subject to heavy floods during the rainy season and provision has been made in the discharge capacity of the dam for floods up to 470,000 cusecs, under which conditions the crest of the dam would be submerged 29 feet. The greatest flood so far experienced occurred in December, 1926, and was estimated to have reached 320,000 cusecs.

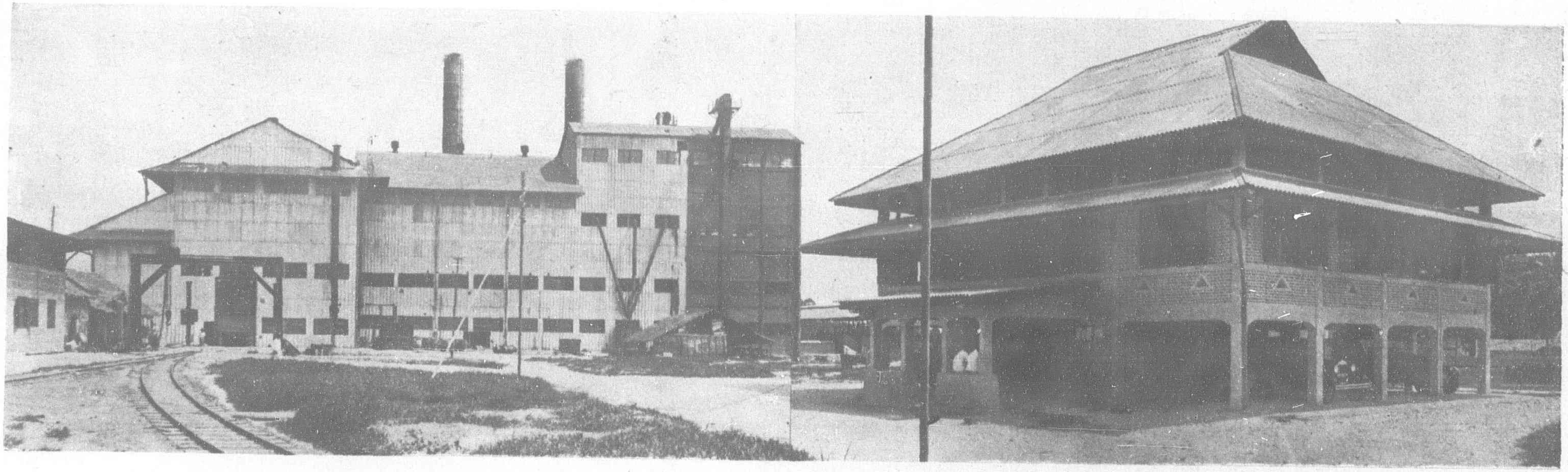
Cherendoh Hydro-Electric Power Station

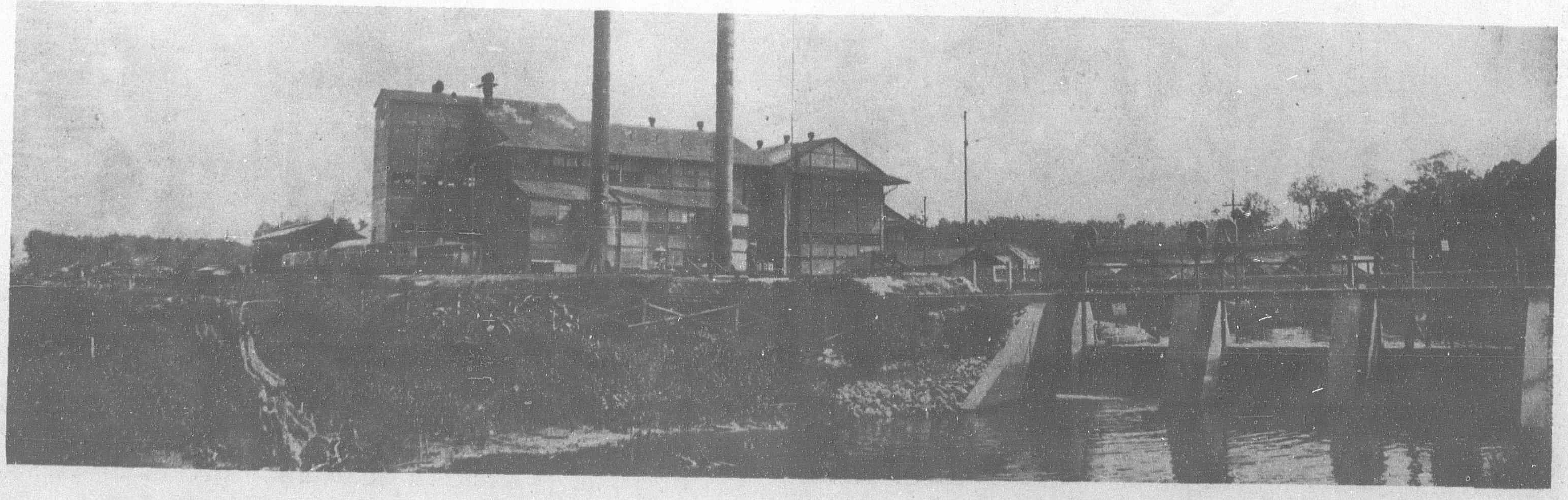
The Cherendoh Power Station is situated at a point where the Perak River flows between two high banks and a solid granite foundation is available. There a dam has been constructed to produce a head of 60 feet under normal conditions. Under flood conditions, however, the water level below the dam rises more rapidly than in the reservoir above, with the result that the effective head may fall as low as 33 feet.

The reservoir formed above the dam has an area of approximately 10 square miles, which is sufficient to meet the daily variations of load during the dry season, although not enough to

PERAK RIVER HYDRO-ELECTRIC POWER SCHEME

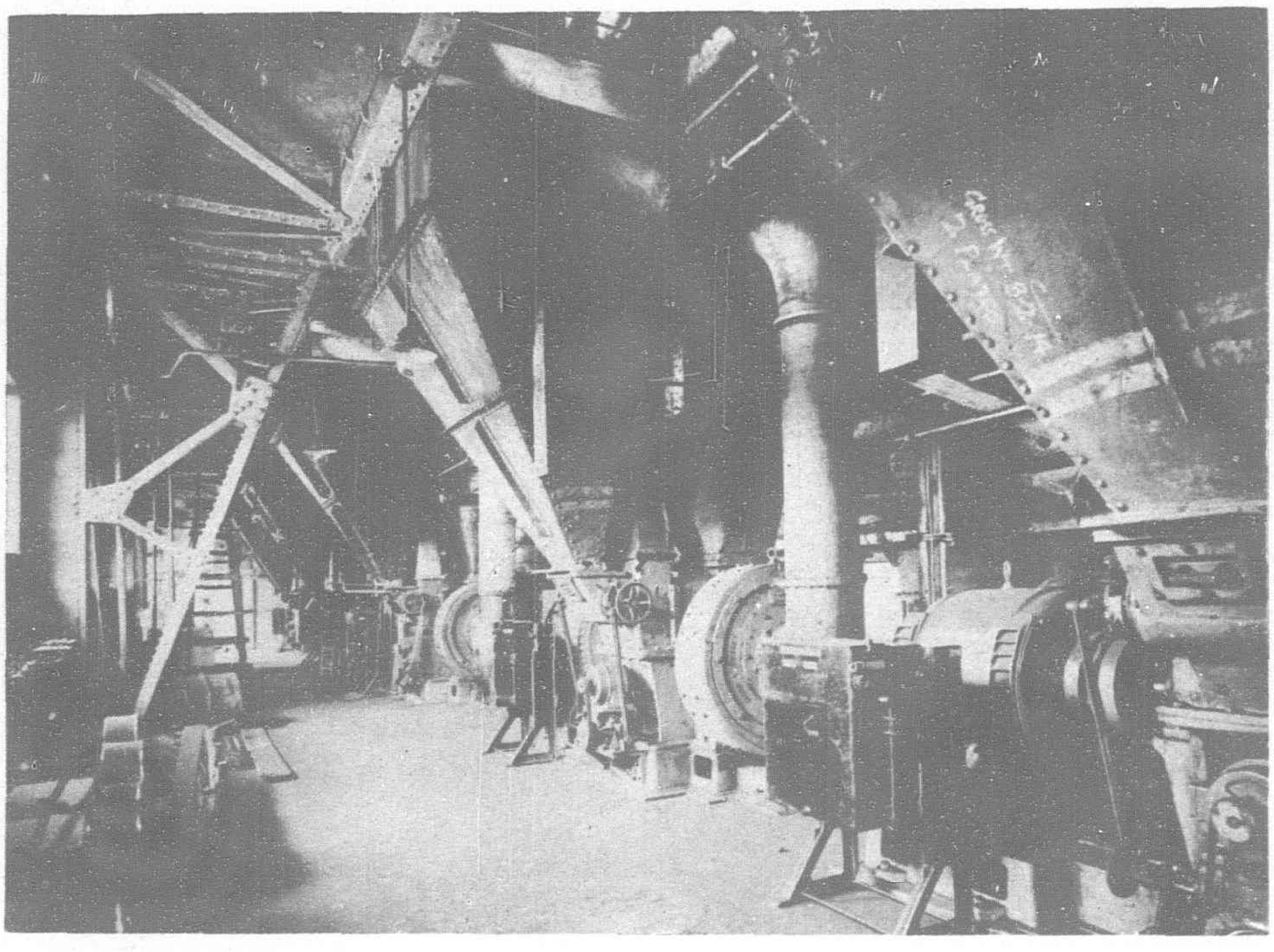
General Views of the Malim Nawar Steam Power Station





maintain the normal output of the station. The site of the reservoir was mainly virgin jungle, and a large amount of felling and burning had to be carried out before filling. Owing to the indented nature of the shores of this storage basin, the periphery is about 200 miles long. The main Government road between Kuala Kangsar and Grik was at some points lower than the proposed level of the water in the reservoir. It was therefore necessary to divert the road and raise its level for a total distance of approximately 2½ miles, in order that it should be immune from the danger of flooding after impounding the water in the reservoir.

Preliminary works at the dam site including rock drilling in the river bed and construction of the camp, approach road and temporary suspension over the Perak River were begun towards the end of 1926, together with the necessary anti-malarial measures. These latter were undertaken in consultation with the Medical Adviser to the Federated Malay States Government, Sir Malcolm Watson, M.D., LL.D., and proved extremely satisfactory. The percentage incidence of fever including all cases was reduced to 0.43 per cent. and averaged 1.96 per cent. during the period of construction. These are remarkably low figures considering that the labor force numbered between 4,000 and 5,000.



Malim Nawar Steam Power Station: Pulverizer Floor in Boiler House

The dam is constructed for the greater part as a hollow reinforced concrete structure of the Ambursen type, and is slightly curved in the upstream direction in order to obtain the best rock foundations and a sufficient length of spillway. At the break points and on the left bank, however, it is constructed as a solid gravity dam. The spillway portion, with a crest at El 193 feet, has a total length of 684 feet and is divided into two sections by a sector gate which has a free opening of 100 feet and is situated between piers Nos. 11 and 111 near the center of the river.

The hollow spillway section of the dam consists of reinforced concrete slabs, forming a continuous deck both on the upstream and downstream faces; these slabs are supported on reinforced concrete buttresses, spaced 18 feet apart on centers and braced with horizontal concrete struts in every second bay. The slabs are held in place by suitable offsets and notches in the buttress heads. Vertical contraction joints at each buttress are provided, also horizontal joints at intervals of 16 feet between each section of the slabs.

The bottom of the dam in the deepest part of the river channel is provided with nine sluices, through which the entire river was passed during the construction of the central portion. Each sluice, which has an opening 14 feet wide and 12 feet high, is lined with steel plating, anchored to the concrete and is closed by a steel Taintor gate, operated from a platform inside the top of the dam. The bottom sluices are arranged in three groups of three, with a blind panel between each group permanently closed on the upstream side. These blind panels act as contraction joints between the groups of bottom sluices, and also serve as drainage outlets to prevent excessive uplift on the dam.

The upper portion of this sluice section is similar to the spillway dam, except that a horizontal concrete diaphragm with transverse slots in its downstream end is provided above the sluices. This serves to reduce any difference in the water levels in adjacent bays. Further protection against differential pressure between buttresses is effected by communicating openings through the buttresses themselves.

The Taintor gate consists of a skin plate bent to a radius of 20 feet fastened to angle frames attached to trunnions which are secured to the concrete of the buttresses. These gates are capable of withstanding a head of 86 feet, and are opened when raised into a space inside the dam above the steel linings.

The outlets are made watertight at the sides and the top and bottom sills by rubber seals, carried by the gate and pressed tightly against the fixed parts by the pressure of the water.

The operating gear, which is mounted on a platform at El. 175 feet inside the dam, consists of a line shaft extending over all the gates and driven from either end through a reduction gear by an electric motor. This shaft drives, through a friction clutch, the gate hoisting gear consisting of two pinions, each meshing with the teeth of a rack rod attached to one side of the gate.

The sector gate dam is provided at the top with a pit into which the gate is lowered when open. Since the water is allowed to enter this pit when the gate is open, the slabs forming the pit have been made as watertight as the upstream face of the dam. The solid piers at each end of the sector gate dam have their tops at El. 218 feet and one of them carries the gate operating gear.

The gate, which is 103 feet long and 16 feet high consists of a skin plate supported by 12 sector shaped frames, each of which is hinged to a bearing built into the dam. The upper surface of the gate is provided with timber decking into which slots have been cut near the upstream edge. These admit water to the gate pit when the gate is lowered and the upward thrust of this water balances the weight of the water flowing over the deck.

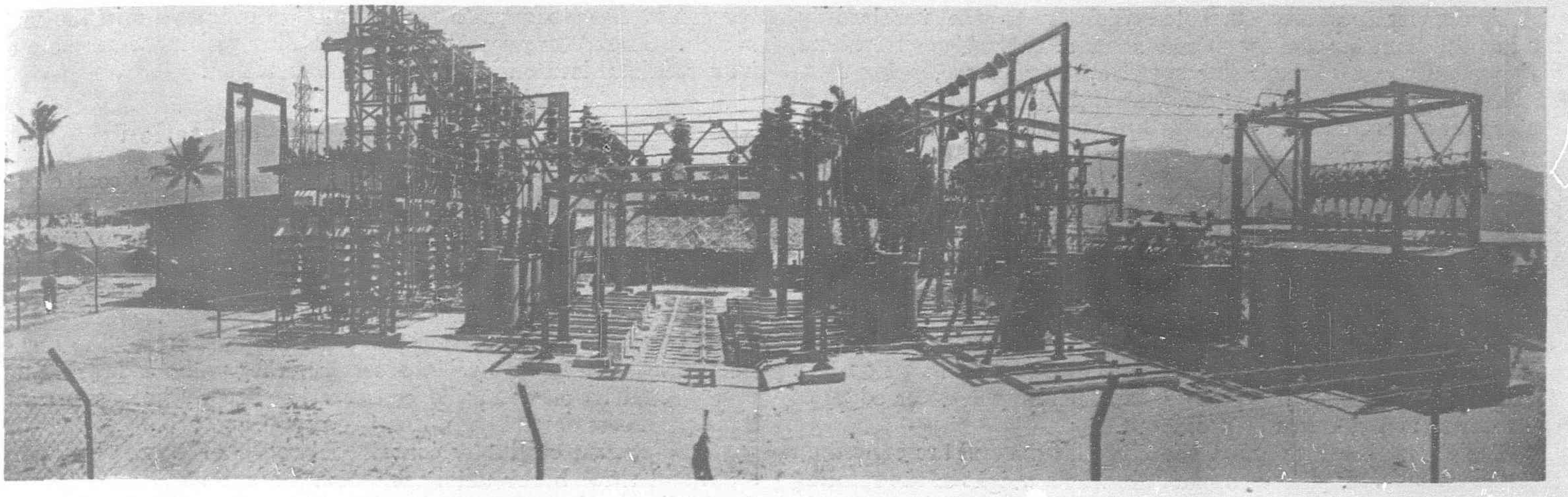
The weight of the gate complete is approximately 140 tons, but being hydraulically balanced it requires very little force to move it. The operating gear consists of rods with racks and pinions. It is driven through a reduction gear from a 17 h.p. motor surmounted on one of the piers above flood water level and connected with the gearing on the other pier by steel shaft.

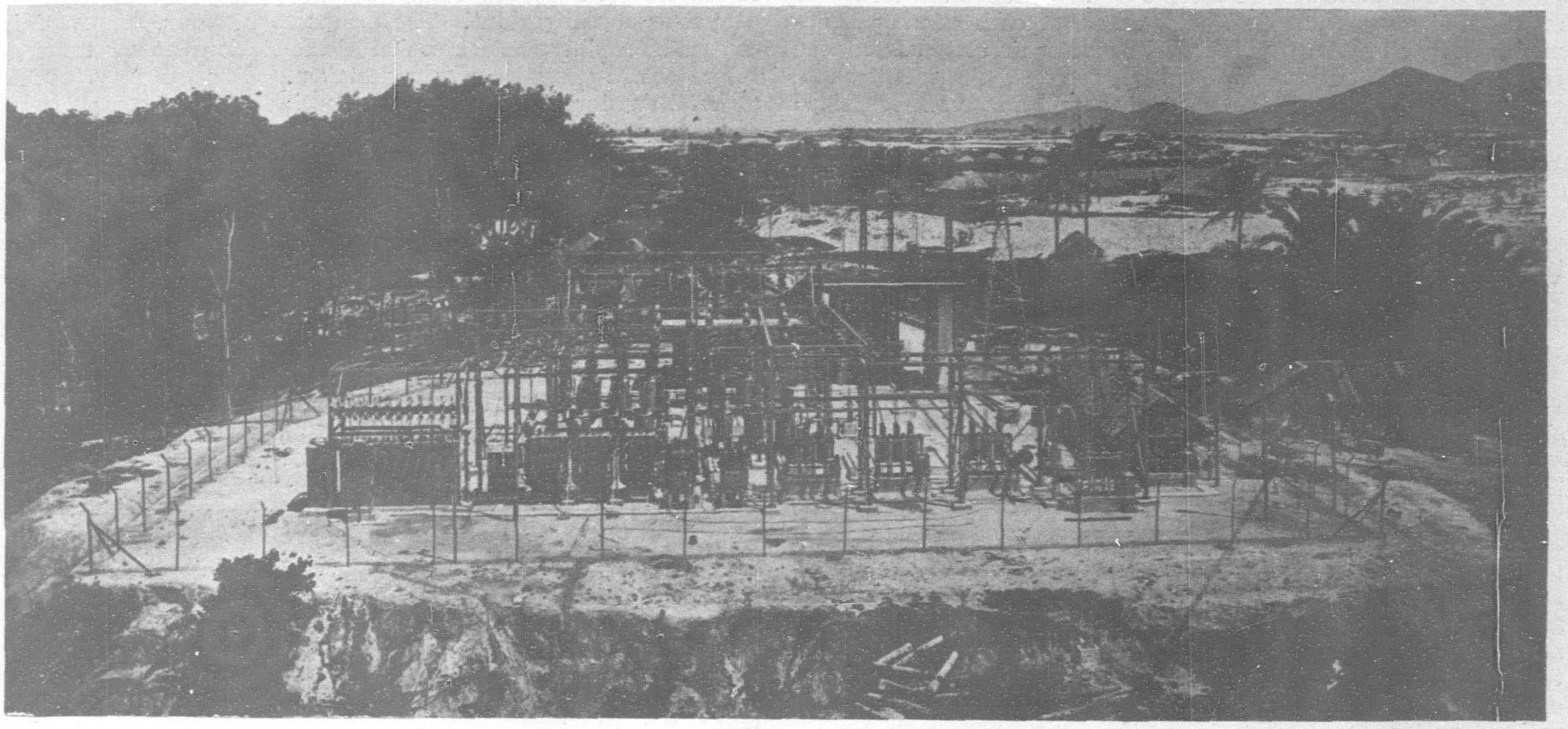
The solid gravity type dam on the left bank has the same spillway curve as the hollow spillway dam of similar height. This part of the dam, the piers, and the abutments at the ends, were poured in sections with vertical contraction joints extending down to the foundations at intervals of 30 feet. The abutments on either bank are non-overflow gravity dams with a crest at El. 218 feet and extend into the river banks at the ends.

The bed of the river below the dam is protected from scour by reinforced concrete aprons, extending some 100 feet downstream and provided with a steel lined retarding wall to break up the jet of water spilling over the dam. In order to make the heel of the dam water-tight, the upstream slab is extended into the solid rock and grouted under pressure.

An inspection and drainage tunnel runs the full length of the dam close behind the cut-off trench, while a gallery communicates with the Taintor gate operating gear at El. 175 feet from either end of the dam. In addition a steel footbridge spans the right hand spillway section and the sector gate, thus affording access to the operating gear for the latter.

The intake is an extension of the dam near the right bank. The lower portion is of similar construction to the spillway dam. Above this it is divided into sections by three pairs of heavily reinforced buttresses, the intake for each unit being between one pair. Each opening is 21 feet wide, 20 feet 6 inches





Two Views of Selibin Outdoor Substation

high, and is provided with trash racks and closed by a single head gate.

This gate is built of steel supported on a substantial framework which is mounted on a carriage having four rollers on each side. It is capable of operating under a head of 44 feet when there is no water on the downstream side. The rollers run on vertical steel rails secured to the concrete of the buttresses to which the water thrust is transmitted. The operating gear is mounted directly over the gate on a superstructure, the gate being raised or lowered by a rack attached to each side.

The river traffic at Chenderoh consists of timber rafts and sampams, and in order to transport these from one side of the dam to the other a boat way has been constructed. This consists of a broad guage (5 feet 6 inches) railway track on the right bank between the reservoir and the river below the dam. A bogie wagon, 15 feet wide and 43 feet long, and capable of carrying the largest raft is hauled along this track by a petrol driven locomotive of 125 h.p., provided with a winch for hauling, the raft out of the water.

The power house, located close below the intake, is a reinforced concrete building having three main floors. The lower floor supports the turbines, whose draught tubes form part of the substructure.

During floods when the rail water level is high, the turbine floor is flooded, and in order to protect the turbine covers a steel casing 18 feet in diameter is erected over the turbines reaching up to the floor above and accessible from it. This floor, 31 feet above the turbines, is used for cables, pipes and various auxiliaries, while the generator floor at El. 190 feet forms the main floor of the station. Strong reinforced concrete columns support the girders for the travelling cranes in the generator room, the necessary windows being provided in the walls between the columns. This floor is extended to the landward side to provide unloading space.

A switch house in the form of an annexe is situated on the upstream side of the power house at the landward end. This contains the battery room, 6,600 volt switch cubicles and staff room in the basement, while on the generator floor level are the control room, Superintendent's office, and entrance.

The turbine spiral casings are connected to the intake by short self-supporting steel penstocks. The power house contains three turbines, each coupled to a generator of 9,000 k.w. The turbines are of the vertical shaft, Francis type, having steel spiral cases and a single runner. They are each required to give 9,025 k.w. on the shaft beam when utilizing 2,000 cusecs at a head of 60 feet, and 9,150 k.w. with the gates fully opened at a head of 53 feet. Their speed is 93.8 r.p.m.

The runner, which weighs 20 tons, is of cast steel with mild steel cast-in blades. Owing to the fact that its size (the maximum diameter is 12 feet 4 inches) exceeded the maximum loading guage of the Federated Malay States Railways, special transport arrangements had to be made from the port of entry to Kuala Kangsar. The runners were finally taken to site from Kuala Kangsar to Taiping by road.

The servo motors for operating the guide vane mechanism are mounted on the turbine covers, but the governors and actuators are on the generator floor, being belt driven from the generator shafts and connected to the servo motors by pressure oil pipes. Each unit is supplied with its own oil pump, but the reservoirs are interconnected so that in the event of the breakdown of one pump, one governor can be supplied with pressure oil from the others.

The generators are connected directly to the turbines by 20 inches diameter hollow bored steel shafts. The generators, which on account of their low speed are very large, being some 26 feet across the stator, are rated at 11,250 k.v.a. at 9.8 power factor and generate at 6,600 volts, 3 phase, 50 cycles per second.

The stators are sunk below the floor level so that ducts are formed round them into which the hot air from the machines is discharged and led out of the building. The cool air is drawn in at the center of the machines from the generator room by fans on the rotors.

Each rotor ring on account of its large size could not be transported in its entirety to site, so that the hubs and spiders were split across a diameter. The rims are composed of laminations dovetailed to the end of the spider arms and were built up on site. The poles are pressed into further dovetails on the outer edges of the rotor rims and keyed in position.

The thrust bearings are of the Michell type and are carried on the upper brackets. They support the whole weight of the rotating parts and unbalanced water thrusts on the runners amounting to some 170 tons per machine. The whole of each bearing is immersed in an oil bath which is cooled by water circulating in cooling coils. There are three guide bearings, two on each generator and one on each turbine which are normally supplied by a self-contained pump. For emergency use a motor driven standby pump is provided which can supply any machine.

Direct coupled exciters are mounted on each shaft above the thrust bearing having an output of 105 k.w. at 60/250 volts.

Two 40 ton overhead travelling cranes are provided for service in the power station. They can be coupled and used together with a balancing beam for lifting into place the alternate rotor, which weighs about 80 tons. For lighter lifts they are equipped with an auxiliary hoist of 10 tons capacity and also a 3 ton pulley block.

The current from the generators is led by PILC cables to sheet steel cubicles in the switch house basement, which contain isolated switches and the connections for the service supply to each machine. This consists of a 3-phase transformer, 100 k.v.a. 6,600—420 volts which supplies on its LT side the auxiliaries for the main unit and also for the general service switch board. This latter can be supplied by all three machines, but the connecting oil switch is interlocked with the main EHT transformer in such a way that the LT switch cannot be closed until the main switch is closed. The station service board is located in the control room on the floor above, together with the desk panel controlling the main switches in the outdoor sub-station and the main engine room telegraphs to the main generators.

Each generator is directly connected to one bank of transformers without the interposition of any oil switches, the generator and transformer bank being operated as one unit. Each transformer bank is composed of three single phase oil immersed water cooled units of 3,650 k.v.a. connected delta on the LT side and star on the HT, there being one spare unit. The HT pressure of the bank is 66,000 volts, but tapping switches are provided to give + 5 per cent. The cooling of the oil is effected by circulation through an oil cooler supplied by water from the reservoir. The water discharge from the cooler is passed through an ejector connected to the turbine cover drainage system, thus acting as an automatic standby in the event of the failure of the drainage pump.

The transformers being of the outdoor type are placed in the outdoor switch station, together with the 66 k.v. circuit breakers and isolating switches. The substation is built of steel girders on concrete foundations supporting the duplicate k.v. busbars and isolating switches and also serving as a dead end for the outgoing lines. The transformers and isolating switches are mounted on concrete plinths below this structure. The oil switches, of which there are six, namely three transformer, two line and one busbar coupler, are arranged with each phase in a separate tank. The operating gear is of the solenoid type and is controlled from the bench board in the control room. The isolating switches are gang operated from ground level from a rod and lever arrangement capable of being locked in position. A metre guage track permits both transformer and oil switches being taken into the power house for overhaul or repair.

The neutrals of the three transformer banks are earthed through an arc suppressor of the Petersen coil type of 1,300 k.v.a., so arranged that when the fault current reaches a predetermined value a relay, connected to the secondary of the coil which allows sufficient current to flow to operate the productive gear and trip the main switch. The Petersen coil and the earthing resistance are both oil immersed and located in the outdoor substation.

Malim Nawar Steam Power Station

A steam power plant designed for burning local coal on the pulverized fuel principle has been built close to the main Federated Malay States Railway line at Malim Newar, some ten miles south of Batu Cajah, in order to maintain the continuous output of the system during the low water periods in the Perak River and also to act as a standby and voltage regulating station. With a view to building up the load on the system preparatory to the hydro-electric station being put into service, the Malim Newar station was erected as early in the construction programme as possible, and began commercial operation in December, 1928.

The station originally contained two 6,000 k.w. turbo alternators and three boiler units each with a maximum evaporation of 52,000 lbs per hour, one turbo-alternator and one boiler being regarded as standby plant. The demand for power, however, increased so rapidly that extension of the station became necessary before actual operation was undertaken. Consequently a further turbo-alternator set of the same capacity as the former sets and one larger boiler (90,000 lbs per hour maximum evaporation) were added. These were taken into service in June, 1929, thus raising the continuous output to 12,000 k.w.

The fuel for normal running is Rawang, lignite with a high moisture content which has a calorific value of about 8,500 B.T.U. per lb. As this coal is liable to spontaneous combustion if stored for more than a few days, a reserve stock of higher grade fuel of about 11,500 B.T.U. per lb is kept for emergency use. Cooling water for the condensers is normally obtained from an adjacent stream, the Sungei Plekat, across which a small dam has been built. During the dry season there is insufficient water, so that a further supply has to be diverted through a canal from the Kampar River to the Plekat. In addition spray ponds are used for cooling the circulating water which is then returned to the condensers.

The coal is brought into the station from the raw coal bunkers by belt conveyors and an elevator, passing through a rotary crusher which reduces it to about 1-in. cube. It is delivered to bunkers situated in the roof of the drier house, from which it is passed through steam heated rotary driers, where the moisture content is reduced from 27 per cent. to 10 per cent.

The boilers are fired with pulverized fuel on the unit system, and the dried coal passes directly to the pulverizer hoppers, to which it is distributed by two screw conveyors. The pulverizers are of the impact type, having a capacity of four tons per hour each. The coal is fed automatically into the pulverizing chamber where it comes in contact with a number of rotating steel beaters which reduce it to a powdered state. The coal dust is carried from the pulverizer to the burner by a current of preheated air, passing *en route* through a classifier which rejects the coarser particles and returns them to the mill.

The combustion chamber of each boiler is fitted with side and rear water cooled walls and a water screen across the bottom to prevent slagging of the ash. The burners are fitted in the front wall which is not protected by any water tubes. The four boilers are of the water tube type with a single steam and water drum. The three small boilers are capable of a normal output of 42,000 lbs per hour, and a maximum of 52,600 lbs per hour, while the large boiler is capable of a maximum load of 80,000 lbs per hour. All are designed for a working pressure of 255 lbs per square inch guage and are fitted with superheaters to give a total temperature of 660 degrees F.

After leaving the boiler the combustion gases pass through an air preheater of the rotary type, the elements of which are alternately exposed to hot gas and cold air. The reduction in temperature of the gases by the preheater is 350 degrees F., while the inlet air is raised from 90 degrees F. to 450 degrees F. Two such units are installed capable of dealing with the flue gas from the four boilers. The gas after leaving the preheater is delivered to an independent stack.

There are two induced draught fans for each stack, one of which is normally a standby. Three forced draught fans (one spare) and two auxiliary draught fans supply air from the atmosphere to the preheaters and the hot air ducting through which this air is led to the pulverizers and burners.

The steam from the boilers passes through the 12-in. steel mains to two steam receivers in the turbine house basement, from which the steam is taken direct to the turbines. These machines, of which there are three, are of the impulse type, having eight stages, and run at 3,000 r.p.m. They are arranged for bleeding 7,600 lbs of steam per hour at a pressure of 40 lbs per square inch absolute for evaporators and feed water heaters. Each turbine exhausts to a surface condenser giving a vacuum of 27-in. with cooling water at 95 degrees F. In order to secure continuity of operation of the circulating water pumps in so far as motive power is concerned, a duplicate supply is arranged either from the general service switchboard or on the unit system from a 100 k.v.a. transformer connected to each alternator directly.

The alternators are direct coupled to the turbines; they are rated at 6,000 k.w. at 0.8 power factor, 6,600 volts, 3 phase, 50 periods, and have an overload capacity of 25 per cent. for two hours. Closed circuit ventilation is employed, each machine being fitted with an air cooler. When the hydro electric station is supplying power to the system, one of the alternators at the steam station is required for operation as a synchronous condenser. In consequence each machine has been arranged for this purpose, and is provided with a starting switch connecting it to one of the other machines, the two machines being run to speed together by one of the turbines. The machine operating as a synchronous condenser is uncoupled from its turbine, a special coupling being provided for the purpose.

Along the side of the turbine house, remote from the boiler house is the switch annexe, which contains the following apparatus :—

1. 6,600 volt main switchgear. This consists of a 13-panel metal-clad compound filled switchboard with drawout type switches. These control the three alternators, four local feeders, the LT sides of the two step-up transformer banks in the outdoor substation, and the HT sides of three station service transformers. The remaining switch is a bus coupler.
2. A 5-panel bench board controlling the 22 and 66 k.v. switches on the outdoor substation.
3. A 400 volt station service board. This is supplied from the LT side of the service transformers and controls the feeders to the boiler house, spray pumps, and all auxiliaries.
4. A general service board controlling the lighting circuits, and the D.C. supply to the battery and control circuits.
5. The alternator field regulator pillars.
6. A temperature and alarm board to which are connected the thermo-couples in the alternator and main transformer windings.

A basement below the switchhouse contains the three 600 k.v.a. three phase service transformers, three oil immersed reactances on the LT side of these transformers, and the battery room.

The outdoor switching station is the southern terminus of the main transmission line from Chenderoh and therefore contains both 66 and 22 k.v. switchgear. The 66 k.v. gear consists of a double busbar system with line switches and isolators. A bus coupler switch is provided and the system is connected through a fourth 66 k.v. switch to the HT side of a 66/22 k.v. transformer bank. This bank is connected to the 22 k.v. switchgear which is also a double busbar arrangement. A second 66/22 k.v. bank of similar capacity is now being installed and will operate in parallel with the existing bank. The substation is being extended to include the necessary 66 and 22 k.v. switches and isolators for controlling this second bank. The double line supplying the area south of Malim Nawar and the two step up banks of transformers fed by the steam driven plant are connected to these bars.

The 66 k.v. switches are similar to those at Chenderoh. The 22 k.v. switches are not mounted on rollers, but are supported on a fixed steel framework, tank lowering gear being provided. All these switches are solenoid operated, the control switches being mounted on the bench board in the station switchbay.

The 66/22 k.v. transformer bank comprises three single phase units and one spare. They are of the oil immersed self cooled type and are connected delta on the HT and star on the LT sides. The bank is rated at 7,500 k.v.a. and the units are provided with tappings in the HT windings to give-5 per cent. As a protection against internal faults, Buchholz relays have been fitted in the pipe between the transformer and the expansion vessel. The two 22/6.6 k.v. banks are also rated at 7,500 k.v.a. each, and are composed of single phase units, one spare being provided for the two banks. They are in general similar to the 66/22 k.v. banks, but are connected star on the HT and delta on the LT sides. The neutrals of all three banks are thus on the 22 k.v. side, and these are earthed through a Petersen coil and parallel resistance as at Chenderoh. The Petersen coil is in this case rated at 38.5 k.v.a.

The arrangement of the station is such that further extensions bringing the capacity up to 18,000 k.w. with 6,000 k.w. in reserve, *i.e.*, a total capacity of 24,000 k.w., can readily be carried out when the demand for power exceeds the present output of the system. With this object one side of the boiler and turbine houses has been equipped with temporary walls of asbestos sheeting, which can easily be removed but the structure and arrangement of plant will require no alteration or modification when the extension is undertaken.

Distribution System

The map shows the main distribution lines of the system. From this it will be seen that the two power stations are joined by the primary 66 k.v. double line which is 53 miles long. There are three intermediate tapping points on this line at Sungei Siput, Selibin and Talang Pamaya, where step-down substations are provided for supplying secondary lines at 22 k.v. and local feeders at 6.6 k.v. The former consist of double 22 k.v. lines from Malim Nawar to Kampar and Temoh, and from Talang Pamaya to Tanjong Toh Alang which are now being extended to Petaling, and a single loop line joining Selibin to Talang Pamaya and supplying Menglembu, Papan, Batu Gajah and Tronoh. The total length of the double 22 k.v. lines, including the Petaling extension, is 19½ miles, and the loop line is 17¼ miles.

The local distribution from the above mentioned substations is made at 6.6 k.v. and these feeders vary in length depending on the location of the consumers' mines. The longest is about 3½ miles. Where possible several consumers are fed from one feeder.

The primary and eccondary lines are carried on galvanized steel lattice towers with three cross arms so that one circuit may be arranged on each side of the towers. The single line loop is also carried on a double circuit type tower in order to reduce the number of different types used. The towers are some 68 feet in height and are designed for a minimum clearance between the lowest conductor and the ground of 21 feet.

On the 66 k.v. lines there are three types of tower. 1. The intermediate or suspension type used for normal spans and equipped with a single string of insulators (six discs in series) ; 2. The angle type, somewhat heaver in construction and used for deviation of the line exceeding 5 per cent. ; 3. The Transposition type, having a longer upper and lower cross arm to enable transmission of phases to be effected. The angle and transposition types are fitted with two strings of insulators, each consisting of seven discs in series.

For the 22 k.v. lines only two types are used, namely intermediate and strain, or angle, towers. The former are equipped with pin type insulators; and the latter with two strings of two disc suspension insulators. An earth wire is carried on the top of each tower. In the case of the line between Malim Nawar and Kampar an exception had to be made in order to give the lines sufficient clearance over the numerous mine dumps in the vicinity, and the 66 k.v. towers with suspension instead of pin type insulators were used on this section. Two discs in series were first fitted, but it was considered advisable to strengthen the insulation by the addition of a third disc, owing to the prevalence of lightning storms in this area.

The towers are normally secured to stubs set firmly in the ground, but in some cases piled concrete foundations were necessary. In particular the tower footings in the swampy ground around the Kinta River on the Malim Nawar-Talang Pamaya section were especially difficult on account of the lack of means of transport to the sites. Eventually a bank was constructed through the swamp and a light railway track laid to convey the piles and tower material to the sites.

The 66 k.v. lines for local distribution are carried on steel tubular poles with a single cross arm, fitted with pin insulators, the earth wire being carried below the conductors. Tee-offs are arranged where necessary on these lines by means of a structure embodying four poles carrying one or more air-break switches.

The flash over values of the insulators used are as follows :—

	66 k.v. (6 discs in series)	22 k.v. Pin.	66 k.v. Pin.
Dry	315 k.v.	160 k.v.	75 k.v.
Wet	195 k.v.	120 k.v.	42 k.v.

Hard drawn copper wire is used for the conductors, the primary lines having a section of .125 square inches from Chenderoh to

Talang Pamaya, and .1 square inch from the latter point to Malim Nawar. The 22 k.v. lines are all .1 square inch, and the earth wire is .05 square inch. The 66 k.v. lines have different sections varying with the length and power to be transmitted. The standard sections used are .1, .075, .05 and .022 square inch.

There are 11 substations on the system, of which three take their supply from the primary 66 k.v. line and the remainder are supplied at 22 k.v. The 66 k.v. substation at Sungei Siput has not been fully equipped under the present development, as the demand for power in that area does not justify the expenditure. All substations are of the outdoor type with busbars and isolators carried on a steel girder structure to which the transmission lines are strained. Their local supply is at 6.6 k.v., the switches controlling these feeders being housed in outdoor sheet steel cubicles.

The Talang Pamaya substation has no local supply, there being no mines in the neighborhood, but it serves as a supply point for the 22 k.v. lines to Tanjong Toh Alang and the ring main to Selibin. It is equipped with a 10,600 k.v.a. bank of tansformers and the neutral on the 22 k.v. side is earthed through a Petersen coil to protect the 22 k.v. lines radiating from this point. The oil switches on the 66 k.v. and the 22 k.v. systems are electrically operated, the control panel being located in a small switch house.

The Selibin substation is similar to that at Talang Pamaya except that a local 6.6 k.v. supply is required at this point. This is obtained by stepping down direct from 66 k.v. independently of the supply to the 22 k.v. busbars. The two transformer banks at this station are rated at 5,000 k.v.a. for the 66/22 k.v. bank and at 3,000 k.v.a. for the 66/6.6 k.v. bank. A supply at 22 k.v. is given by this station to the adjoining Government substation for distribution in the town of Ipoh, replacing the diesel engine generating station there.

The remaining substations will receive their supply at 22 k.v. and are single or double busbar stations. They are equipped with one or two banks of transformers, according to the load in the neighborhood. Two sizes of transformer, 750 k.v.a. and 500 k.v.a. are employed to make up the bank in these stations, thus reducing the number of spare units required. The stations at Tanjong Toh Alang, Petaling, and Temoh are provided with 22 k.v. feeders in addition to the ones at 6.6 k.v. in order to supply several large mining interests in the vicinity at that voltage.

Lightning arresters are provided on all lines and feeders at each substation, those on the 66 k.v. system being of the oxide film type, and the remainder of the pellet type. No choke coils, however, are fitted. The neutral point of the transformers is earthed through a resistance at each of the secondary substations.

The 6.6 k.v. gear consists of groups of six sheet steel cubicles for controlling the incoming supply from the transformer bank, four outgoing local feeders and the substation lighting and potential transformer supply. On the end of each group a seventh cubicle has been added containing busbar isolators to enable further feeder cubicles to be added without interruption of supply. A second group of four feeders has already been installed at Kampar.

The switches (except the local feeders, which are all hand operated) at Talang Pamaya, Selibin, Tanjong Toh Alang and Petaling, are electrically operated from a storage battery. The control panel and battery charging set are installed in the small switch house at the substation. These battery charging sets, whose output is 8 k.w. are supplied from a small 30 or 50 k.v.a. transformer at 400 volts. At all other secondary substations the 22 k.v. switches are hand operated, as are also the 6.6 k.v. switches.

The protective system adopted for the generators and transformers is of the Merz Price circulating current type. In the Chenderoh station the generators and their respective transformer banks are treated as one unit. In the case of substation transformers the relays operate to trip both HT and LT switches.

The main 66 k.v. line is equipped with differential phase and earth leakage protection at each substation. This is so arranged that under fault conditions it operates to trip out the more heavily loaded lines, disconnecting it from all substation. As a standby to this system, overload and earth leakage relays are provided for each line independently of the other, but these relays have a long time lag in order to give the differential time to operate. These standby relays also afford protection when only one line is in service. The potential supply required for the directional elements is obtained from a special condenser consisting of three condenser type bushings, connected on the line and mounted on a tank with their lower ends immersed in oil. The potential supply is tapped off one of the layers of each bushing, thus eliminating 66 k.v. potential transformers.

The protection of the 22 k.v. lines is similar to that used for the 66 k.v. lines, except that the potential transformers are employed to operate the directional relays. The single loop line has overload relays only at each of the stations on it. All substations are protected against busbar earth faults by a relay operated from a current transformer in the substation structure earthing connection.

The 6.6 k.v. feeders are provided with relays connected with two poles for overload and the third for earth leakage. The relay settings are high in order that faults on the consumers' may be cleared by the protective gear at the supply end.

The substation transformers throughout are oil-immersed self-cooled single phase units, grouped in banks, and connected with star on one side and delta on the other in such a way that each section of the lines has only one neutral point which is earthed. The transformers are of the core type with concentric windings, the end coils of which are specially insulated to withstand high voltages due to line surges. The tanks are all provided with oil expansion vessels and in the pipe connections to these Buchholz relays have been fitted on all 66 k.v. units and also on both 22 k.v. banks at Malim Nawar.

The largest self-cooled transformers are those at Talang Pamaya, each unit having a capacity of 3,500 k.v.a. These operate without any protection from the sun with a temperature rise in the hottest part of the oil not exceeding 35 degrees C. on a full load. One spare transformer is installed in each station, except in the smaller 22 k.v. stations where one spare serves two substations. This spare can be transported on a lorry to the required point.

The consumers' equipment is generally provided by the mining company, space being arranged for the Power Company's meters on the switchboard. In the case of small consumers, however, the Power Company have a number of kiosk type substations and motor equipments which are available for hire. The substation consists of a kiosk with expanded metal sides and sheet steel roof, and is of sufficient size to accommodate a three phase step down transformer (maximum size 300 k.v.a.) together with an oil switch and meter panel. The motor equipments comprise a three phase induction motor, starting switch and resistance, and a static condenser which is permanently connected across the stator terminals, giving a full load power factor to the unit of .91.

During the final 18 months of construction work at Chenderoh, the steam station at Malim Nawar was operated continuously. In this period the average load on the system grew to some 10,000 k.w. and the monthly load factor at the station reached 75.5 per cent. This is a remarkably high load factor, especially when it is remembered that the demand was steadily increasing. The power factor at the station corresponding to the above figure was 82.5 per cent. It is estimated that when the system is fully loaded the annual load factor will reach 80 per cent.

The hydro-electric station at Chenderoh has been put into commercial operation and is supplying power to the system. The load is gradually being transferred to it from Malim Nawar, which station will then be shut down for overhaul until required for augmenting the output of the hydro-electric station during the next dry season.

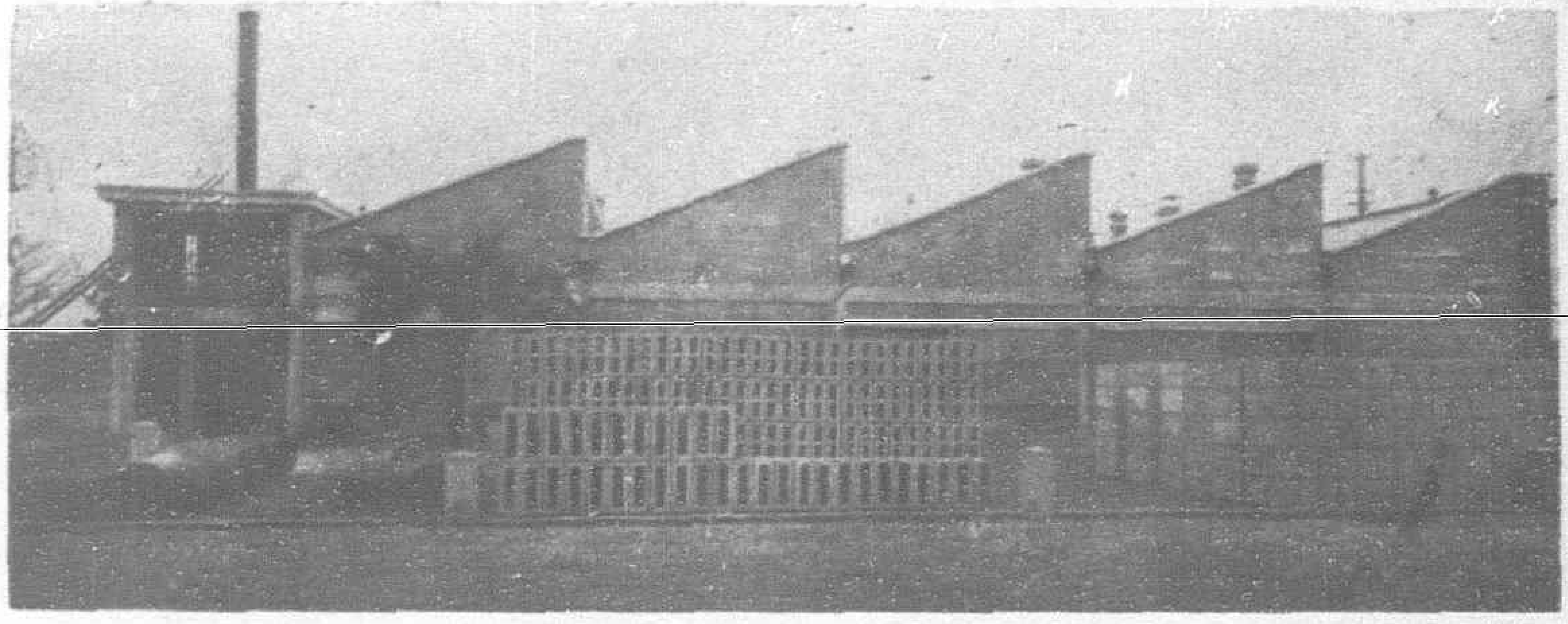
John Thompson Watertube Boilers for Hongkong

An interesting order for a new addition to the China Light and Power Company's plant was recently placed with Messrs. Reilly, Simmons and Milne, representatives in China for the John Thompson Watertube Boilers, Ltd. of England. The installation is intended to replace two boilers of other makes and consists of one Tri-Drum "Gamma" type watertube boiler having a heating surface of 7,740 square feet, suitable for a boiler working pressure of 210 pounds per square inch and capable of evaporating 40,000 pounds of water per hour. The boiler is equipped with superheater capable of raising the steam generated to a final temperature of 600 deg. Fah. and with mechanical stokers for burning Anthracite dust. The contract also embraces the necessary special arch bricks and baffle tiles, steel casings and insulating slabs, soot blowers, galleries and ladders, forced and induced draught motor driven fans and starters, ash and riddling hoppers, damper and tools, steel work above and below floor levels, and all steam and water fittings and mountings and boiler house instruments.

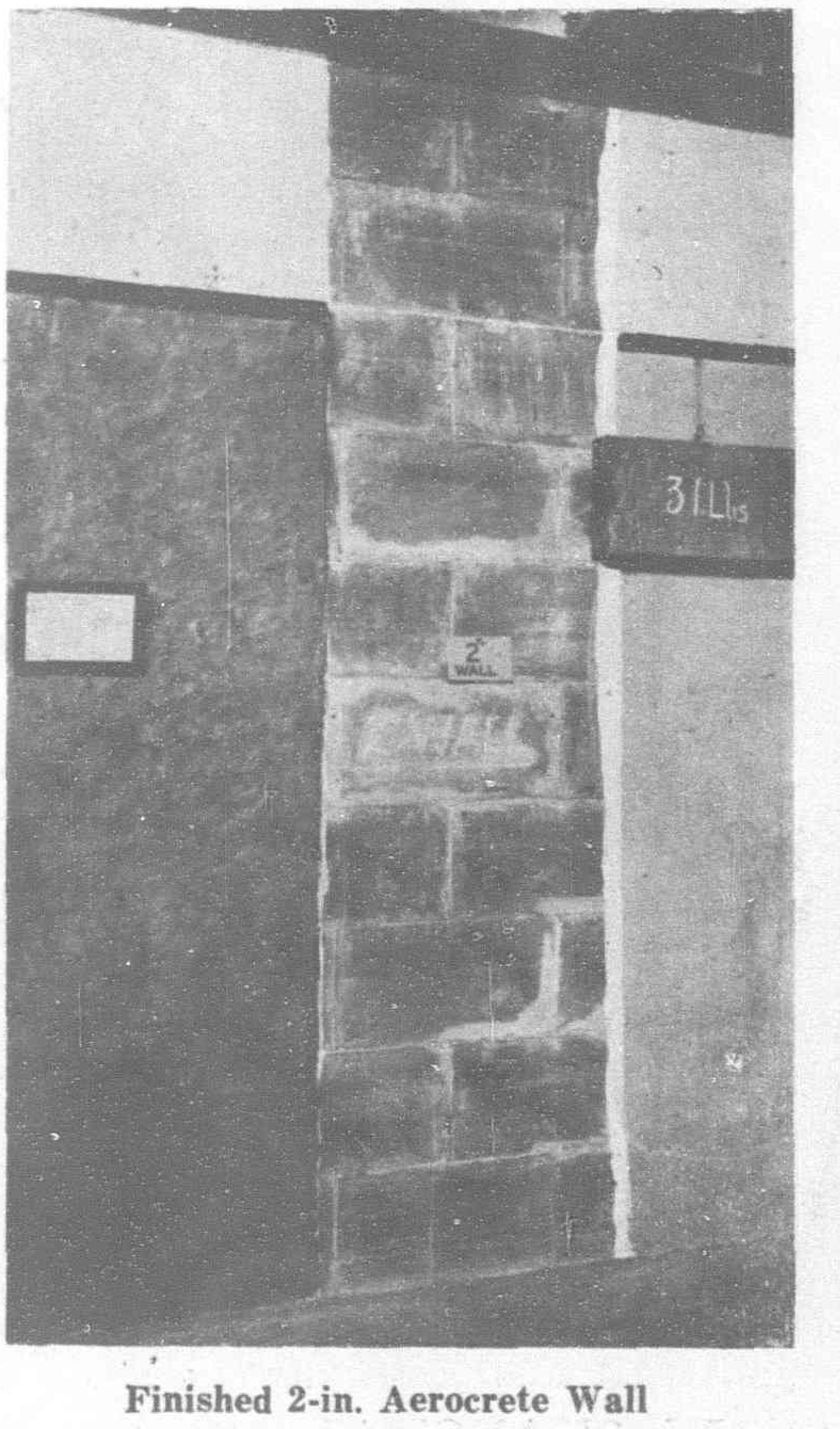
AEROCRETE

A New Invention in Building Material

During the last century many mechanical improvements have been perfected for the benefit of building construction. Research has been concentrated on substituting concrete for a lighter and easier adapted material. The years of research and thought which scientists have given this matter has eventually resulted in the discovery of a material suitable for the requirements called for in present day construction. This new product is known as Aerocrete. The process in the manufacture consists in liberating a gas within the mixture during the setting period and thereby causing an expansion or rise, much in the same manner as dough under the action of yeast. The effect of this expansion is that in the Aerocrete blocks now available, the weight is about one-third of an equivalent size of concrete block. This statement is entirely substantiated by the fact that one cubic foot of aerocrete weighs approximately 50 to 60 pounds, the weight being controlled and pre-determined in the casting of the blocks. This composition has other interesting qualities besides its light weight. It will withstand the driving action of rain far better than brick work. Tests were conducted where a jet of water of a quarter inch diameter was allowed to impinge direct on a fixed spot of tested and treated aerocrete slab for eight hours under the full main pressure. It was afterwards broken and the water was seen to have penetrated only a half inch. The fire resisting qualities are remarkable. While it is well known that concrete is easily destroyed by intense heat, the surface of Aerocrete only may be destroyed by fire. The main mass will remain undamaged. Aerocrete may be exposed to a temperature of 1,700 degrees Fahrenheit four hours, after which a fire jet may be sprayed upon the hot lower surface, which may be washed away only to a depth of ¾-in., leaving the remainder undamaged. Heavy construction for apartments, hotels and office buildings is rapidly being replaced by more scientific methods and modern materials which means lighter constructions, reduction in cost and enormous saving in time and building operations and increase in comfort. The old system of building walls with clay bricks varying in thickness up to 15 inches is now obsolete. Time was wasted during the erection period and after completion for drying walls before occupation. This modern invention encompasses all the requirements demanded by modern architecture, as solid blocks are supplied in sizes of 24 inches by 12 inches of various thicknesses to suit.



Aerocrete Factory in Shanghai



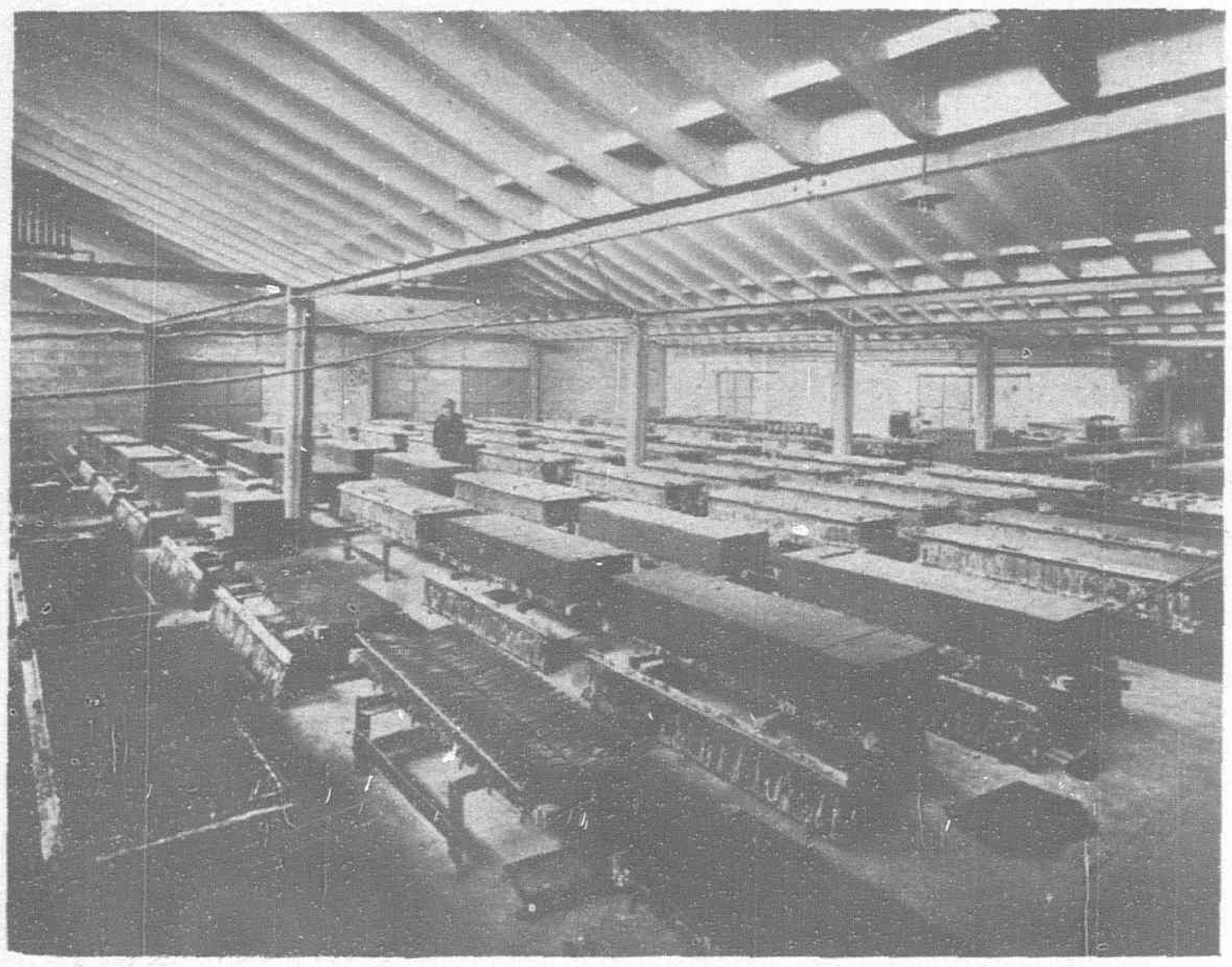
Finished 2-in. Aerocrete Wall

Finished 3-in. Aerocrete Wall

Partition and Outside Wall Requirements

A three inch partition is recognized to be more satisfactory than a five inch brick wall and is but half of the weight. Had it not been for this material the present additional two storeys being erected on the Whiteaway Laidlaw building, could not have been done with cement or bricks as the foundation was too light to carry a heavy overload. Walls constructed with aerocrete need not be as thick as is usually required for brick walls. The saving in weight, time and convenience is therefore tremendous. This new condition has also made an enormous increase in land values as it has made possible the erection of larger and higher buildings with the maximum number of floors, permissible with the enormous load on restricted foundation areas. In addition to the number of floors, the maximum number of independent rooms or apartments can be arranged to show a fair return on the investment. Apartment buildings especially, are being erected in order to meet these requirements, accommodating a large number of people under one roof. This calls for special care in design and materials in order to give as much privacy as possible between rooms. The adoption of light building materials is most essential as solid and thick dividing walls are impracticable on account of the weight. The lighter hollow tile walls convey sound and are therefore unsatisfactory, and while many sound deadening materials have been tried they are unfortunately found to be constructually imperfect. This new building material meets the essential demands called for by modern conditions.

It has been demonstrated to be a practical light and highly perfected form of artificial stone. It is cellular in construction, possesses the specially high insulating and sound deadening properties so essential in apartment buildings of to-day. To prevent sound travelling through floors, this composition is poured "in situ" to a thickness of three inches. Floor boards are secured to wood slippers cast in the



Interior of Aerocrete Factory in Shanghai

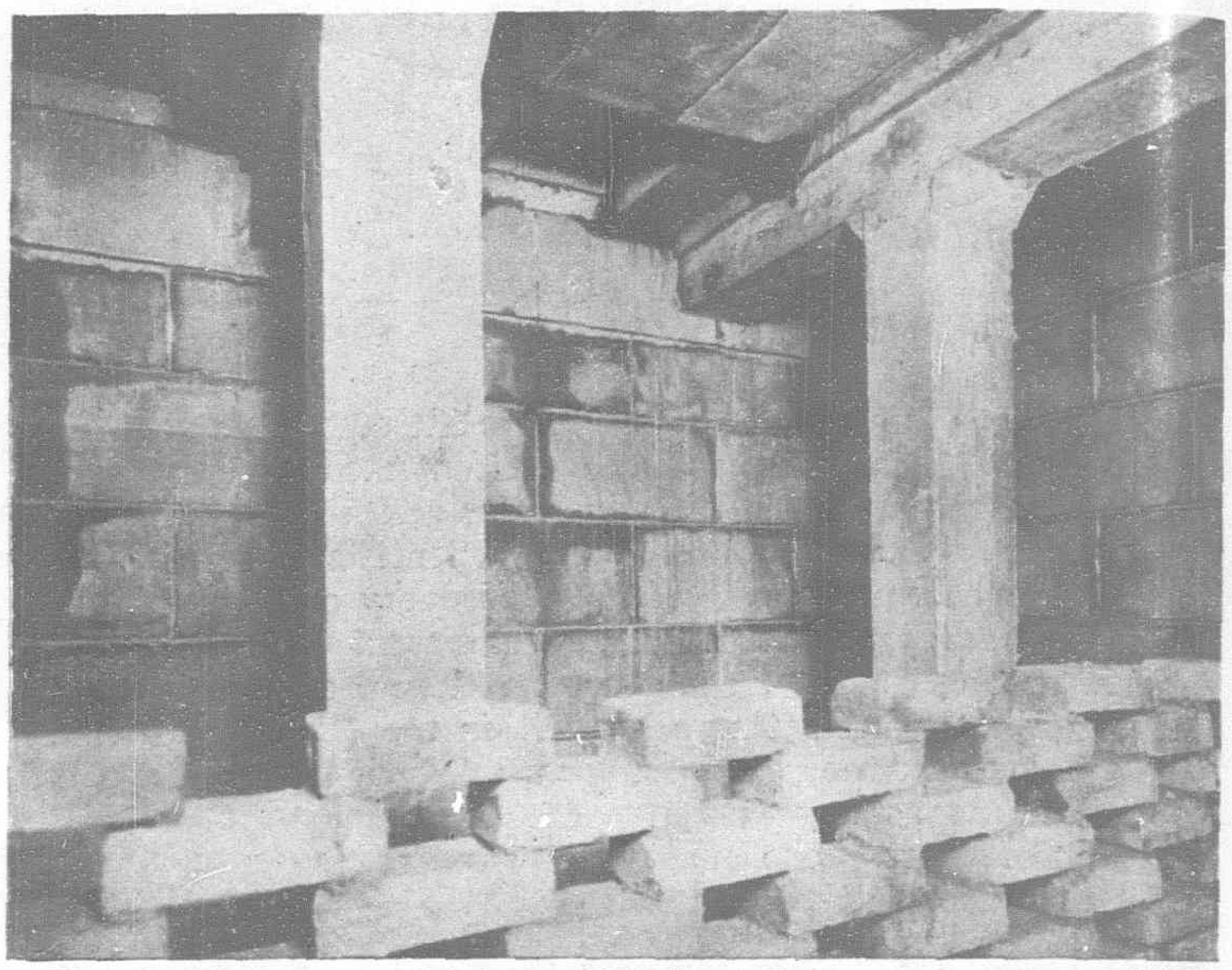


Fig. 4.—Columns and 8-in. wall before Test. Aerocrete on left, showing dampness in roof, walls, and concrete beam

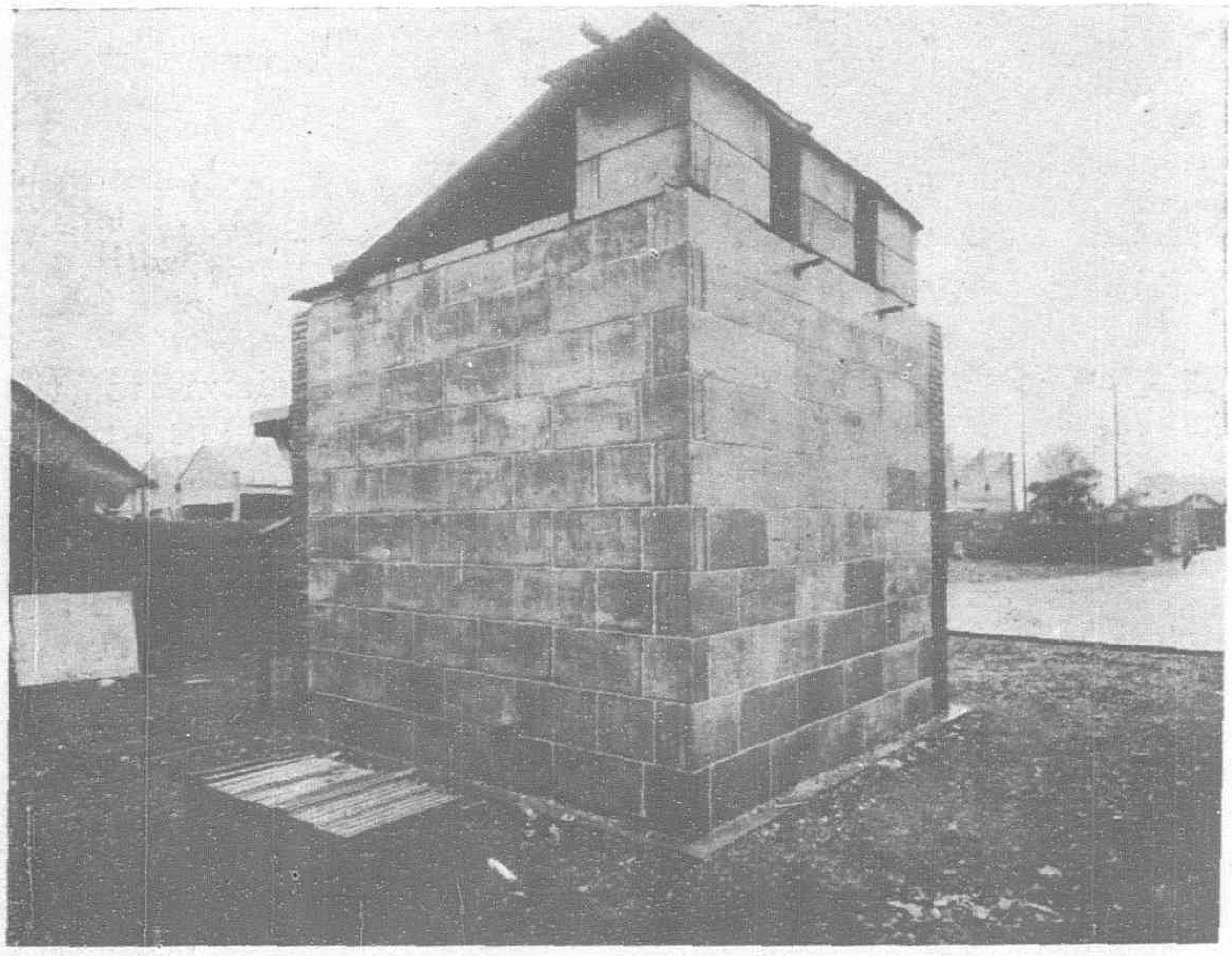


Fig. 1.—Exterior of chamber, before test, showing 8-in. and 6-in. Aerocrete Walls. External surfaces wet, Note reflections of pyrometer tubes

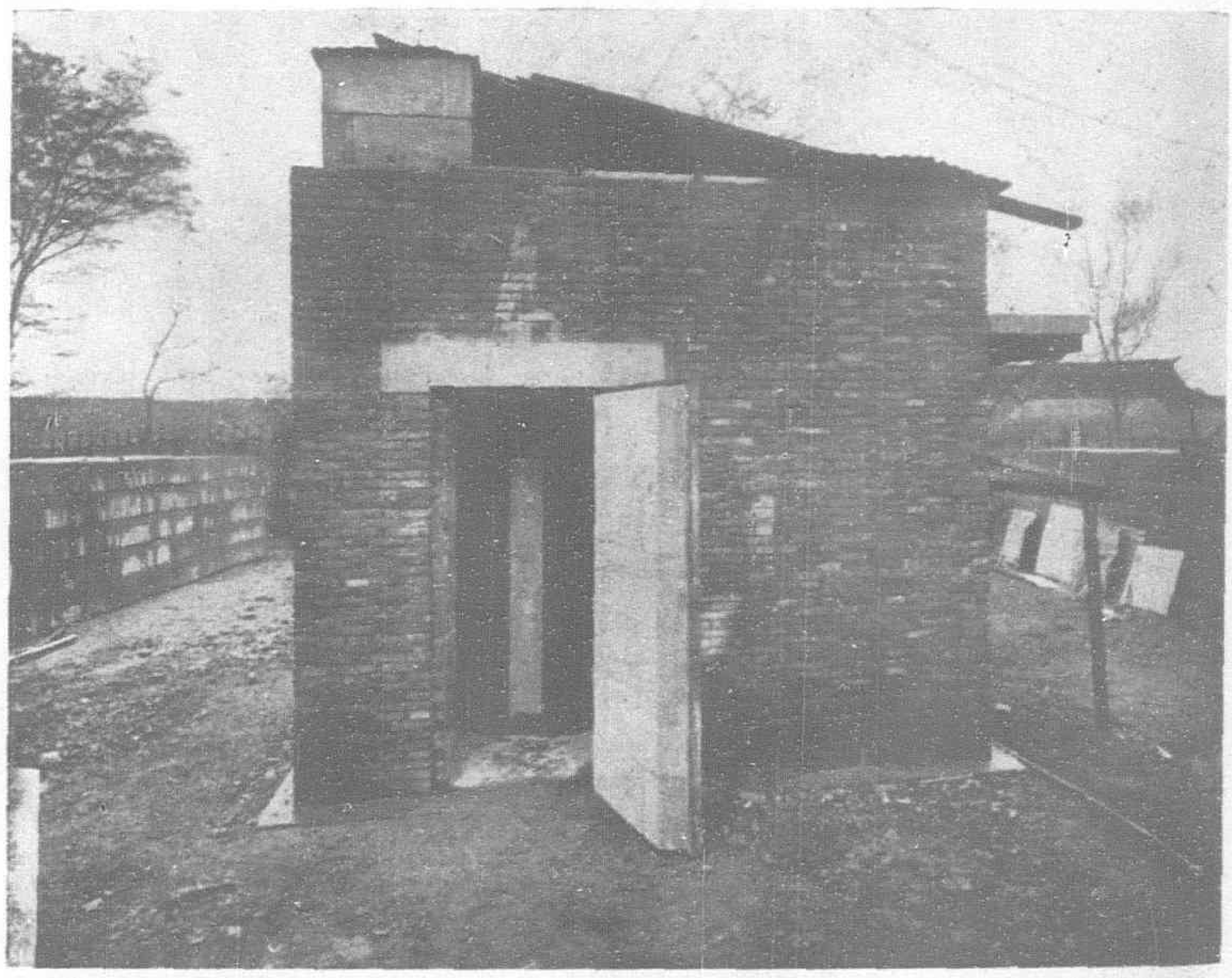


Fig. 3.—Before Test. Access door with 4-in. Aerocrete lining. Aerocrete column immediately inside. Note floor quite wet, and rain outside (two days before test)

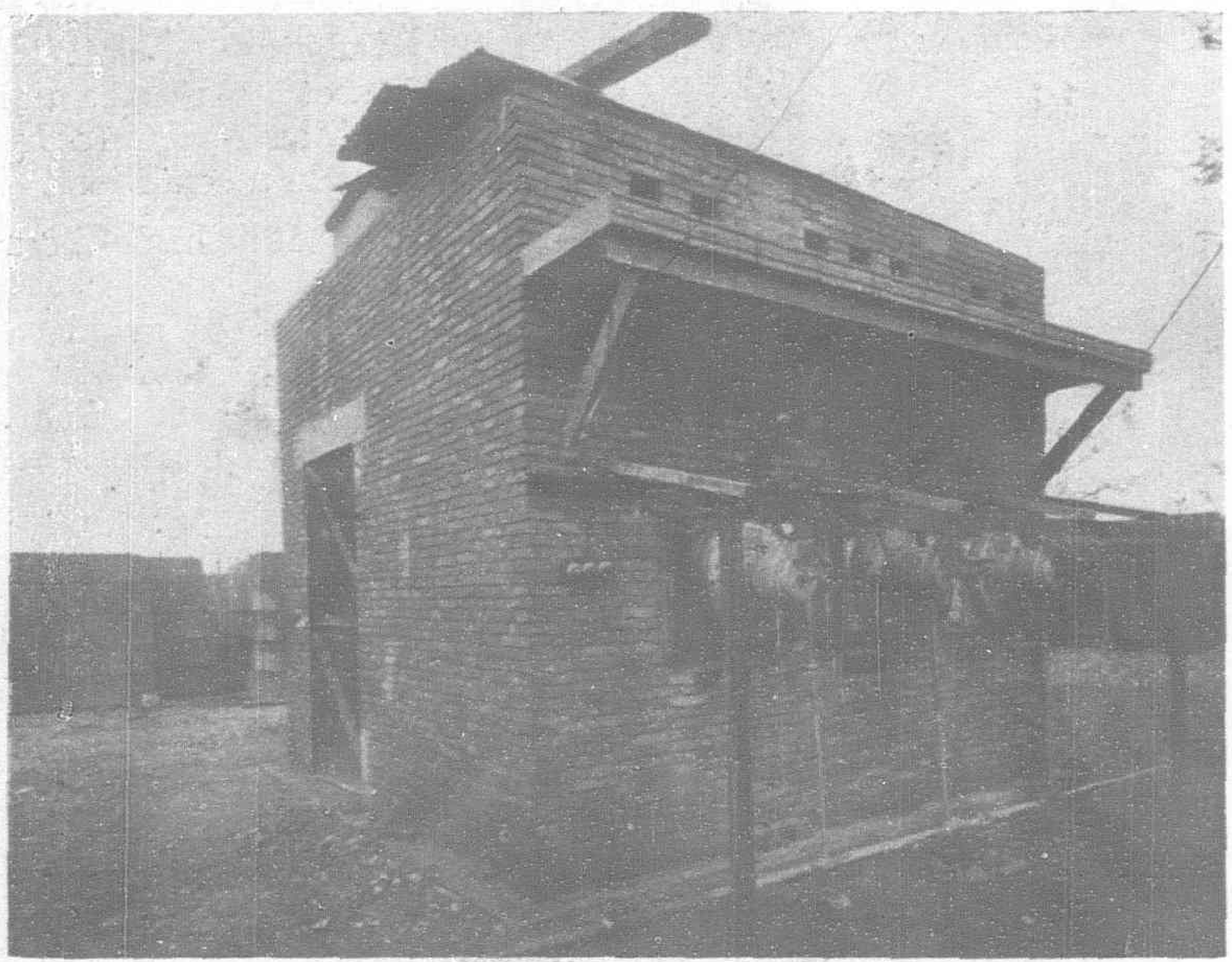


Fig. 2.—Test chamber before test, showing arrangement of burners, access door and air pyrometer tube

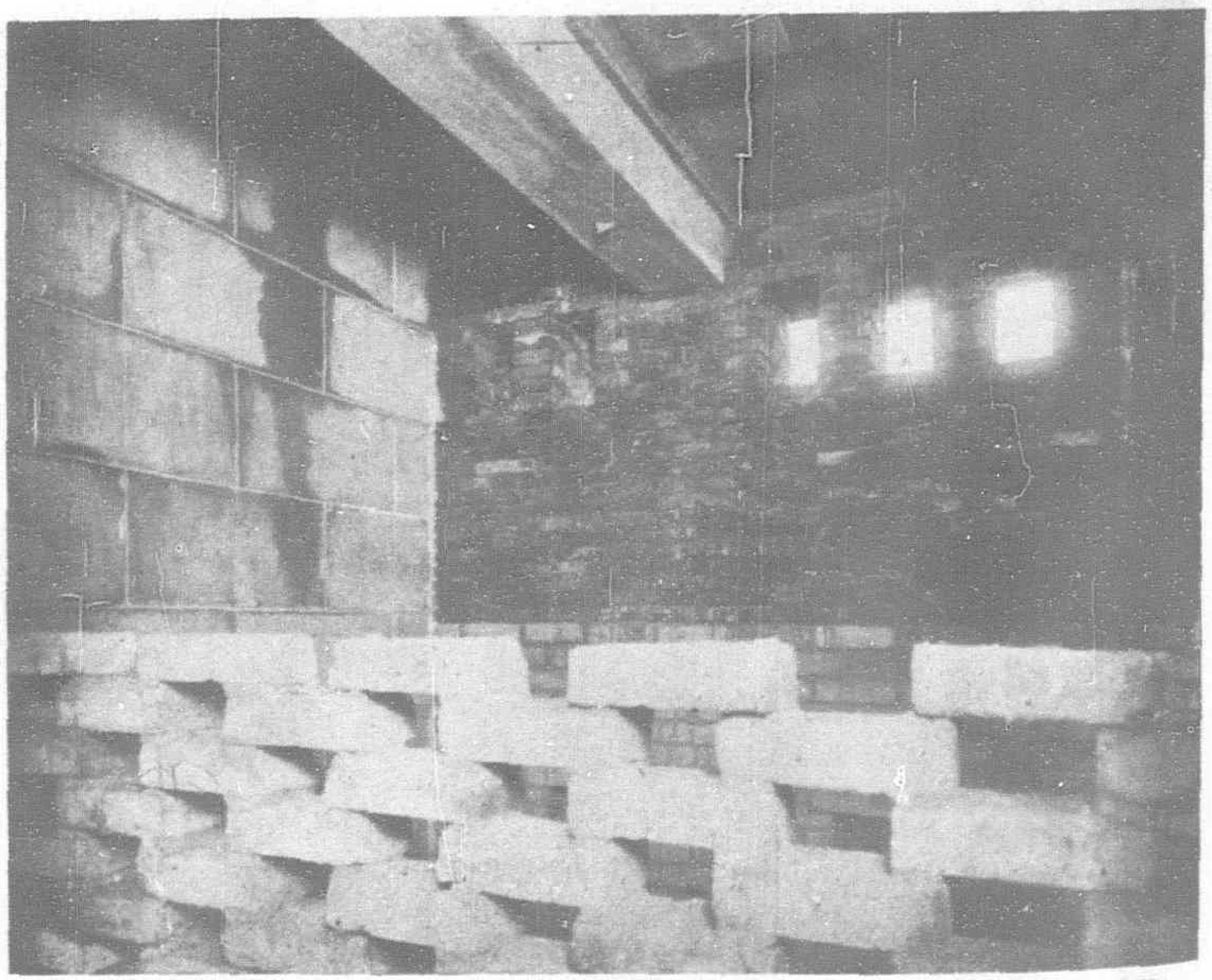


Fig. 5.—Before Test, 6-in. Aerocrete and 14-in. brick walls. Concrete beam protection on left. Note wet patches on wall and roof

AEROCRETE TESTS IN SHANGHAI

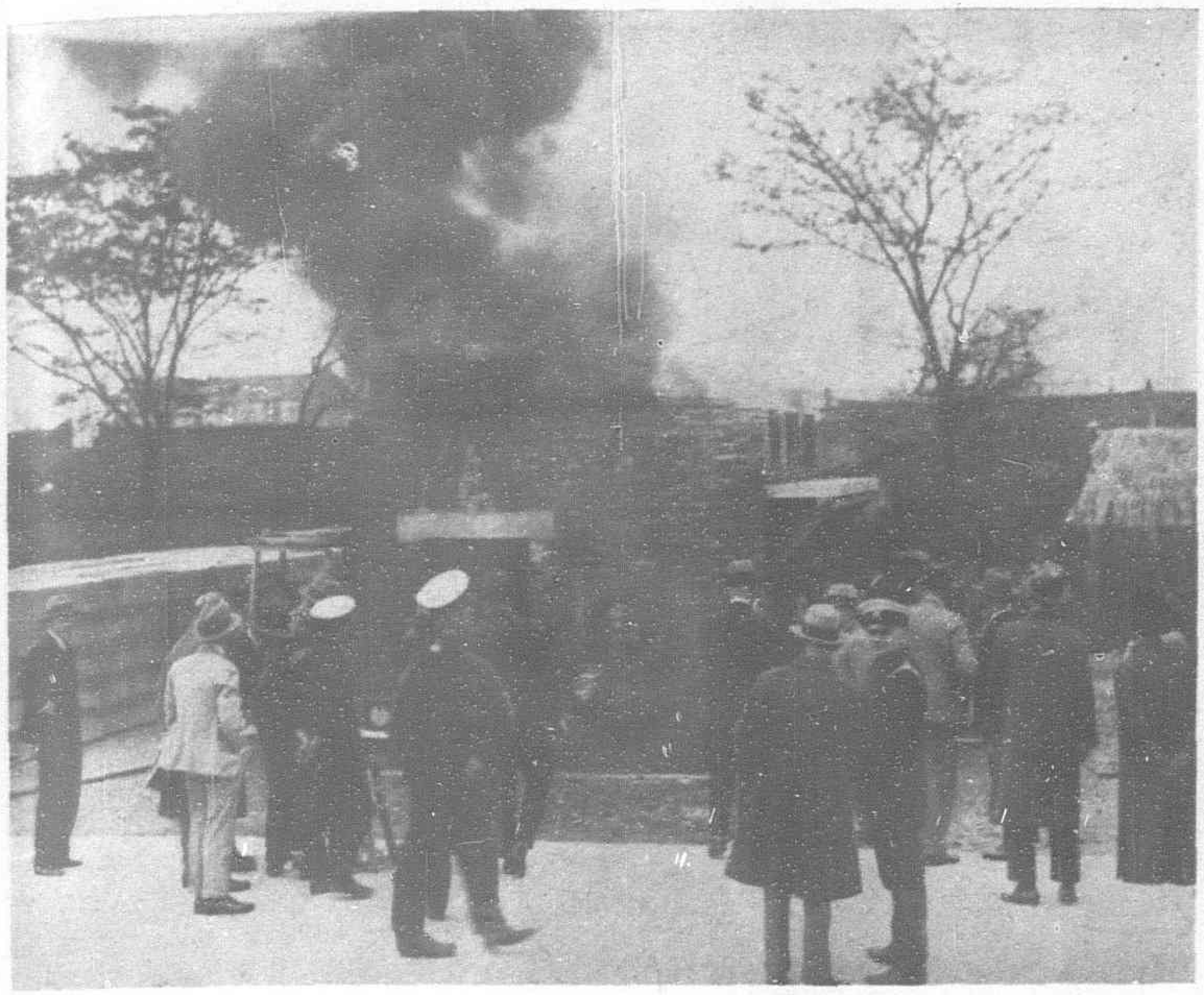


Fig. 6.—Commencement of Test. Pyrometer reading 620° C.

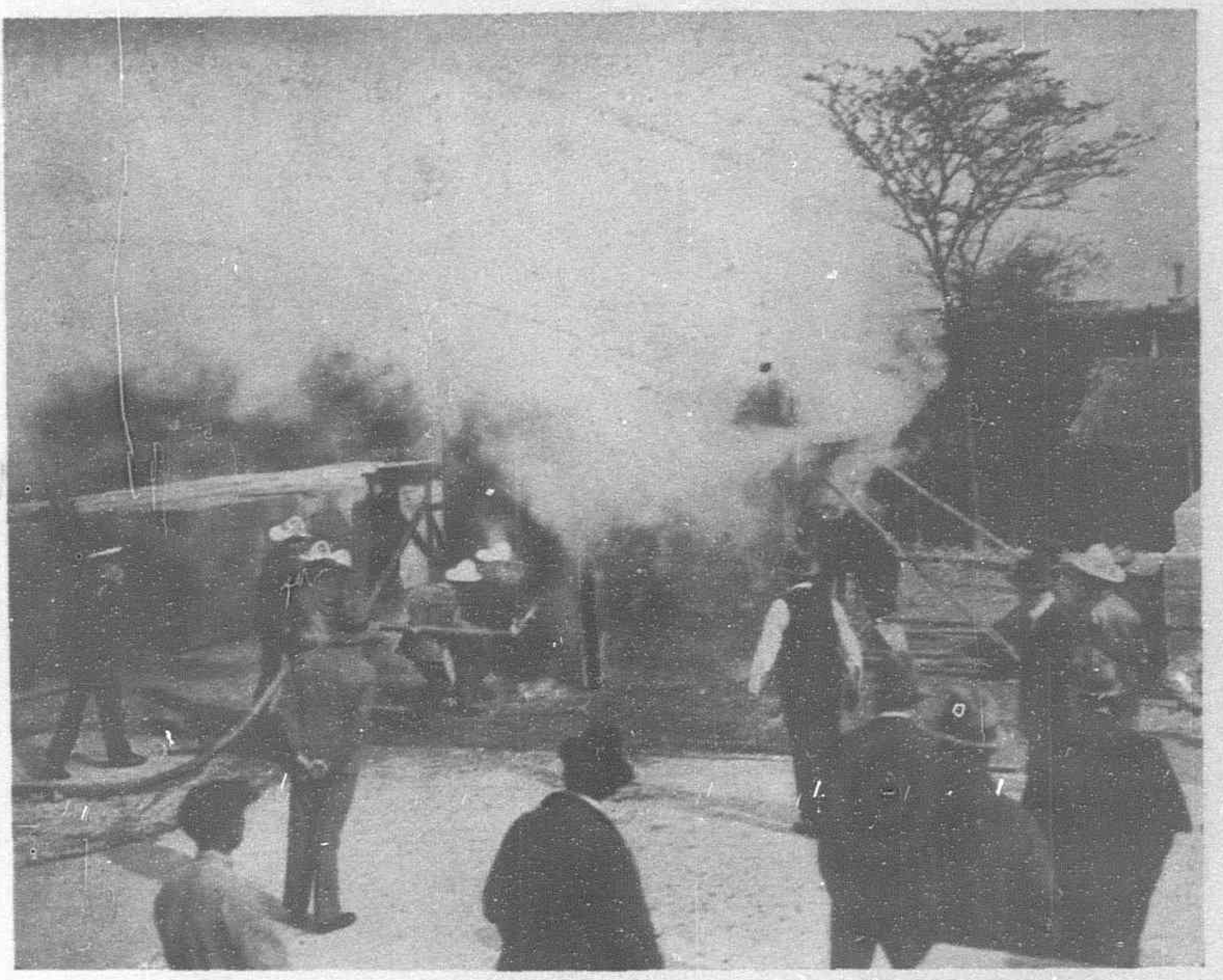


Fig. 7.—Application of water by Captain Dyson

aerocrete making the usual finish to the rooms, and ensuring quietness to rooms below.

The Wayfoong House, recently completed and the Lester Chinese Hospital, The Embankment House, Hamilton House and Metropole Hotel are all being completed with aerocrete. From an economical point of view it has a decided advantage and as a practical material for lightness and resisting extreme heat and cold, it possesses marvelous properties. It has no equal in building construction.

Contractors are becoming more and more acquainted with this material, accepting it as a real necessity in building construction. It is also of great benefit to both the architect and the Builder.

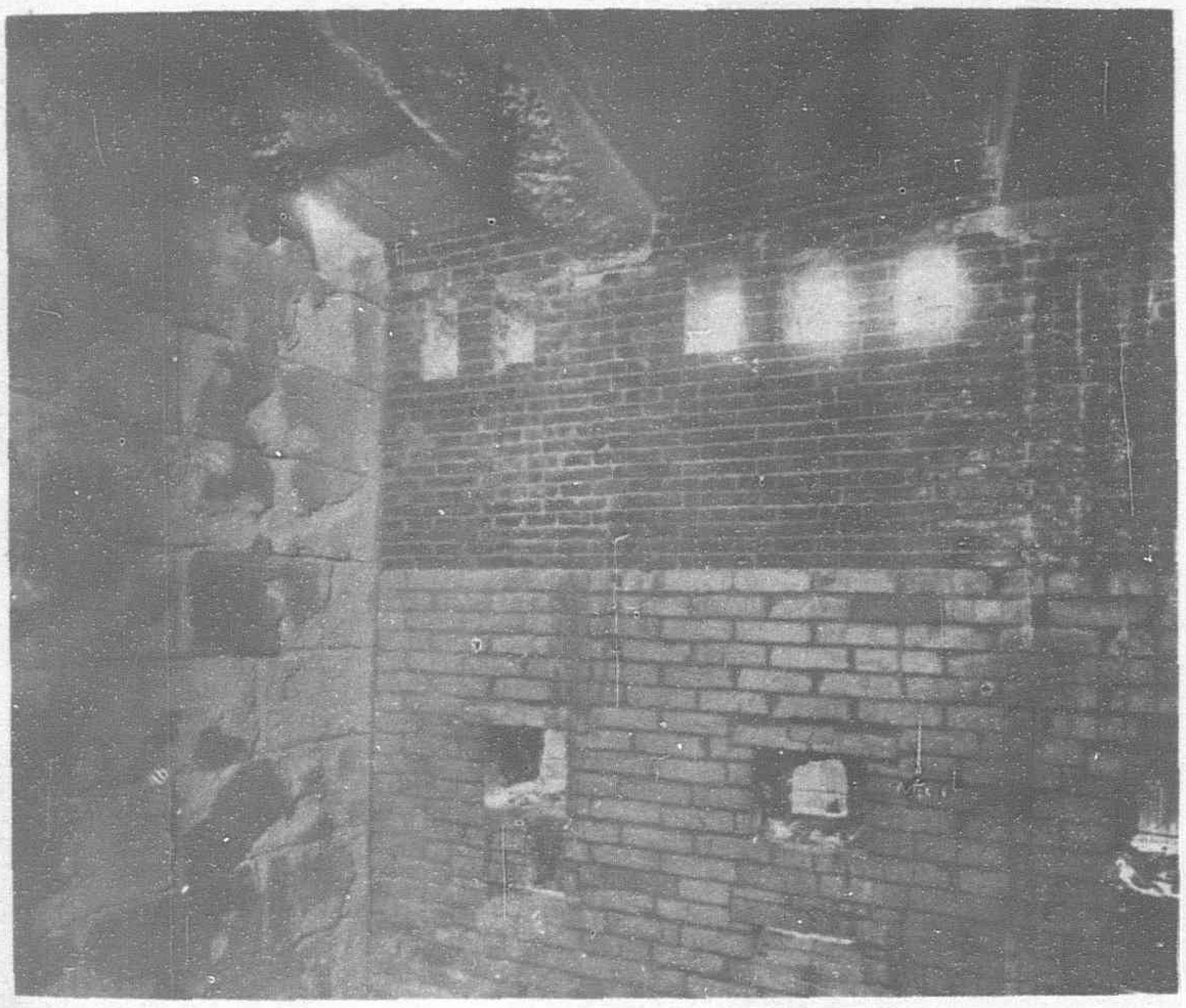


Fig. 8.—After test, 6-in. Aerocrete and 14-in. Bricks. Note fusing of brickwork, fused lower surface of concrete beam protection, erosion of Aerocrete, and burning roof T's.

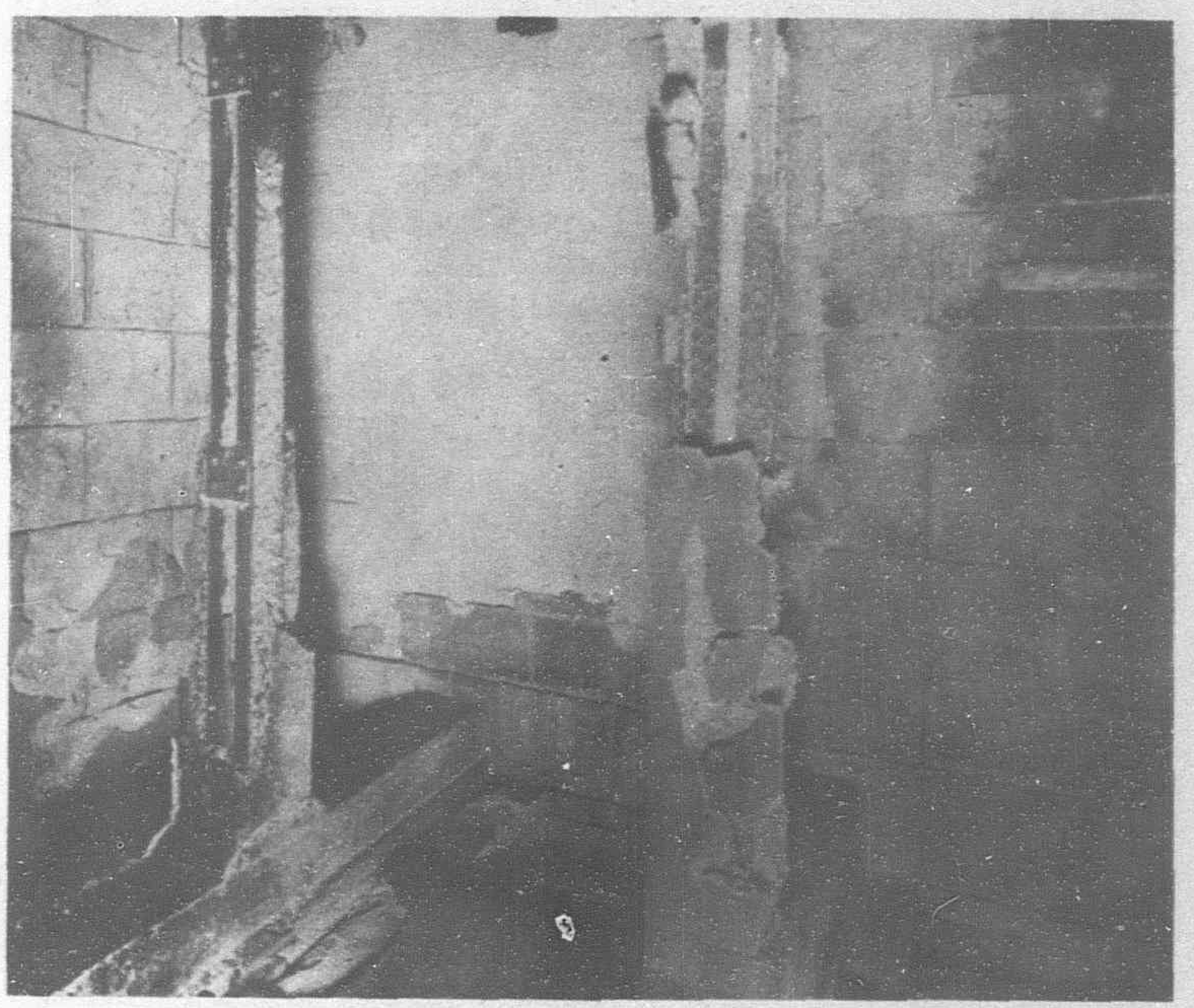


Fig. 9.—Columns and 8-in. wall after Test, showing, wire mesh in Aerocrete protection almost intact, fusing of concrete protection, and pyrometer tube

---

Caterpillar Tractors in China

We are informed that Carlowitz and Co. have been appointed agents for Central China for the Caterpillar Tractor Co., of San Leandro, California, and that in the near future will receive one set of Caterpillar tractors with road-building machine in order to demonstrate the usefulness of this modern machinery for building roads better, quicker and cheaper.

The machinery in question is run by only one or two men, and is capable of building a mud road with smooth equal surface and ditches on both sides three miles in length in about 10 hours. The cost of gasoline and of employees comes to about Mex. $10, per mile of finished mud road ready for traffic. The initial cost of the equipment is also comparatively low and thus the cost of road-building is very materially reduced, to say nothing of the saving of time in connection with this machinery.

One of the main questions with road-building is their maintenance and repair which runs very high, and causes many roads to deteriorate and become unfit for motor traffic. The Caterpillar Tractor Co. is also building a line of inexpensive machinery, which is most efficient for the maintenance and repairing of roads.

There are already several sets of Caterpillar road-building machinery in operation in North China, The Hopei Provincial Highway Department recently purchased a set of Caterpillar road-building machinery for the re-building of the Peiping-Tientsin Highway.

D.K.K's. New Liner "Choshun Maru"

The twin-screw geared turbine passenger and cargo steamship *Choshun Maru*, the latest addition to the fleet of the Dairen Kisen Kaisha, was constructed at the Kobe Shipyard and Engine Works of the Mitsubishi Zosen Kabushiki Kaisha to the order of the Dairen Kisen Kaisha Ltd. The vessel was laid down on November 12, 1929, launched on May 31 and completed and delivered on August 23, 1930.

The vessel is a sister ship to the *Dairen Maru* and the *Hoten Maru* and is intended for the Dairen-Shanghai service.

Principal Particulars

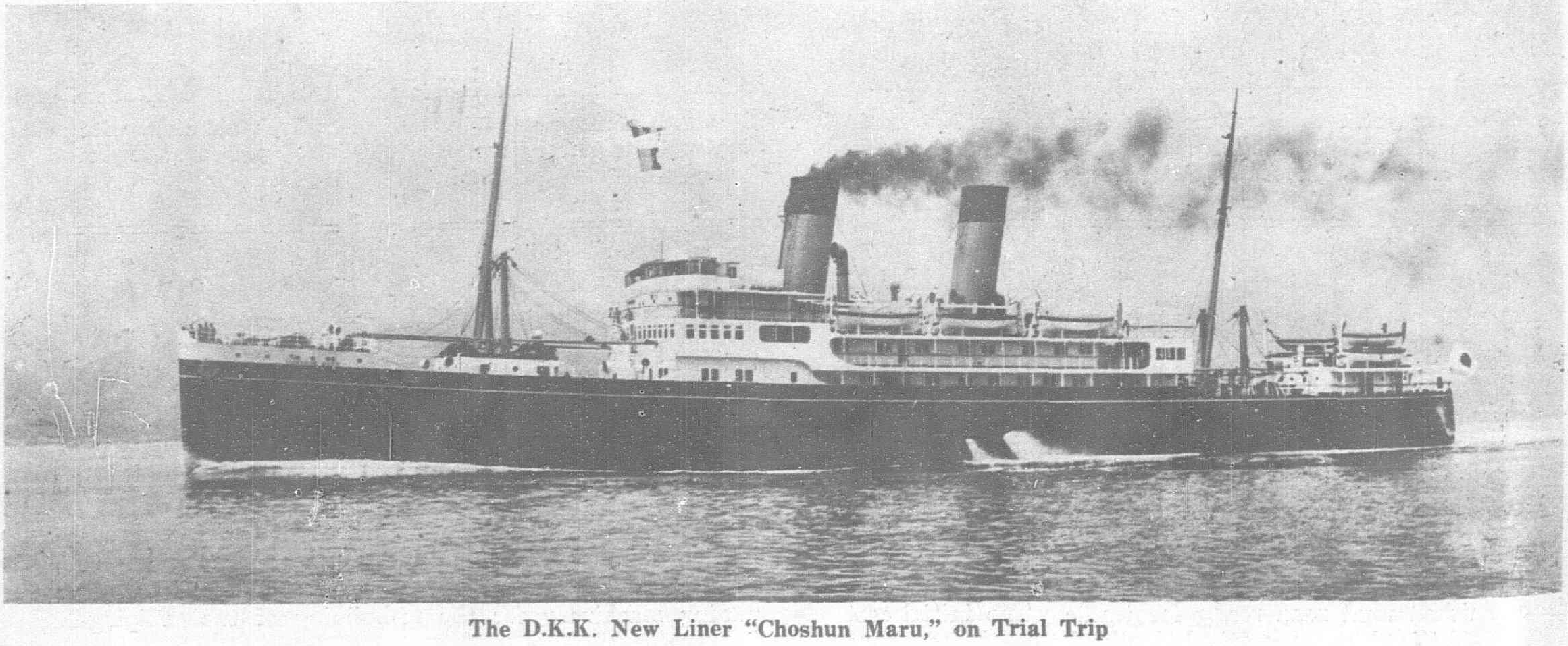
Length over-all	375-ft. 6-in.
Length between perpendiculars	360-ft. 0-in.
Breadth, moulded	46-ft. 0-in.
Depth, moulded	28-ft. 6-in.
Gross tonnage	4,026 tons.
Deadweight capacity	2,806 tons.
Speed	17¼ knots.

Number of passengers :—

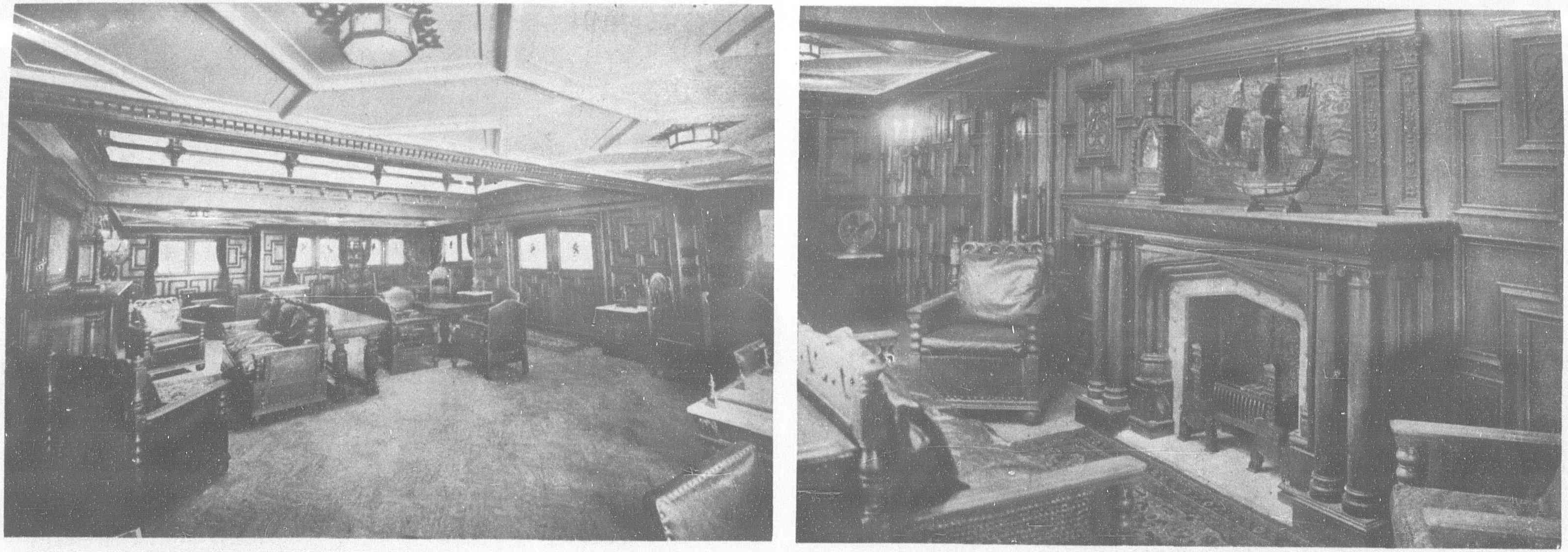
First class (including three in *De Luxe* Cabin)	84
Second class	27
Third class	220
Total	331
Ship's complement	128

General Arrangements

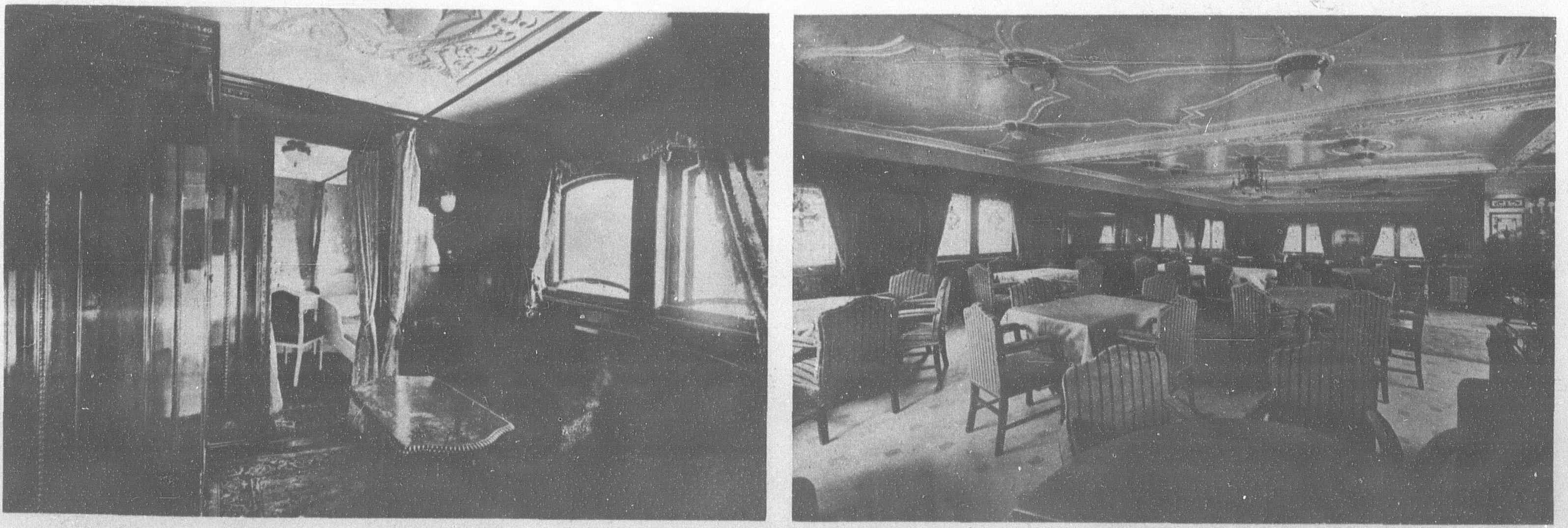
The ship is a super-structure vessel with two complete tiers of decks and a cruiser stern, having an entire length of cellular double bottom between the fore and after peak bulkheads, subdivided into six tanks. She has two pole masts and two funnels, one of the latter, a dummy, mounted on the top of the engine room casing, is utilized for lighting and ventilating purposes of that space.



The D.K.K. New Liner "Choshun Maru," on Trial Trip



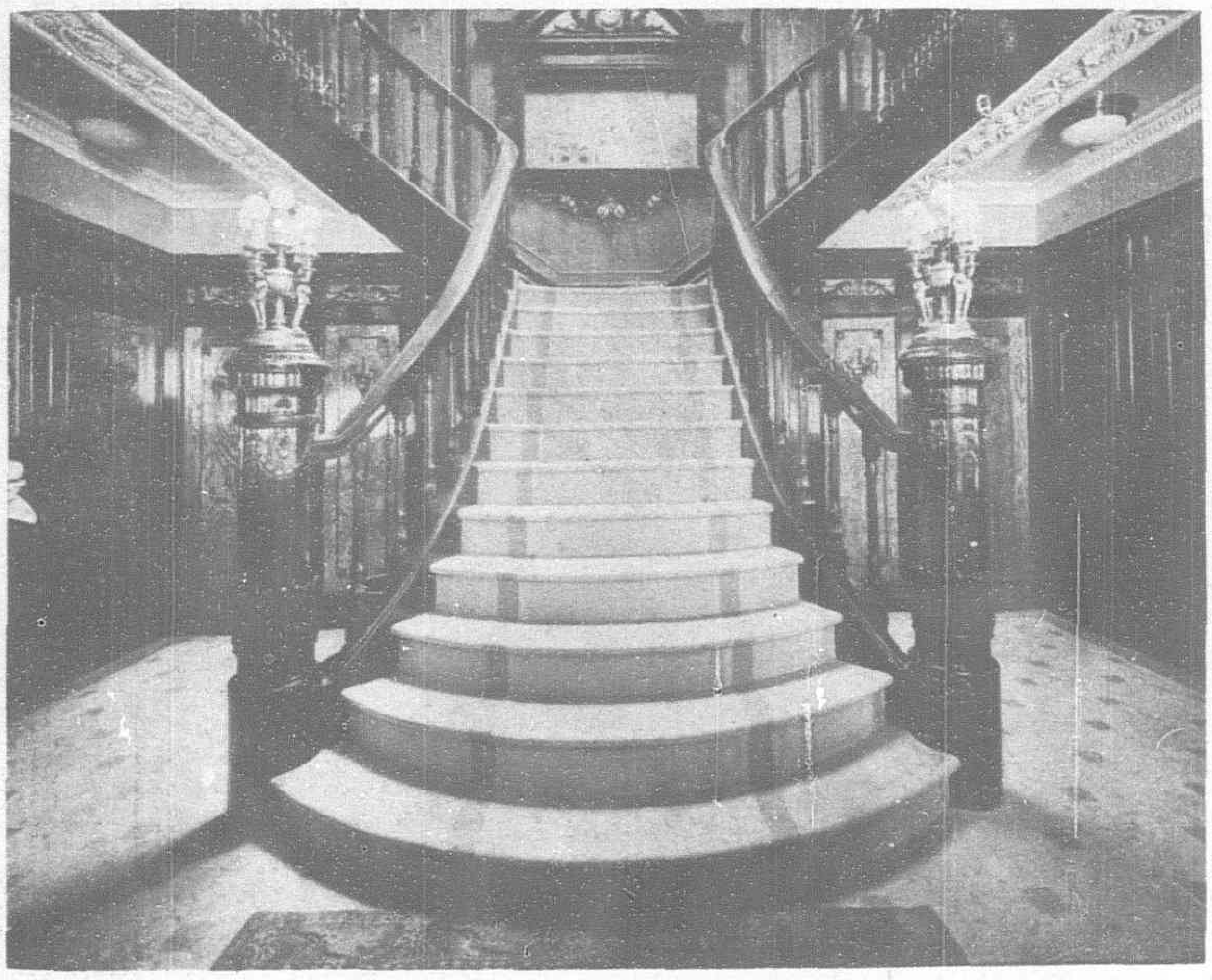
First Class Smoking Room on D.K.K.'s Liner "Choshun Maru"



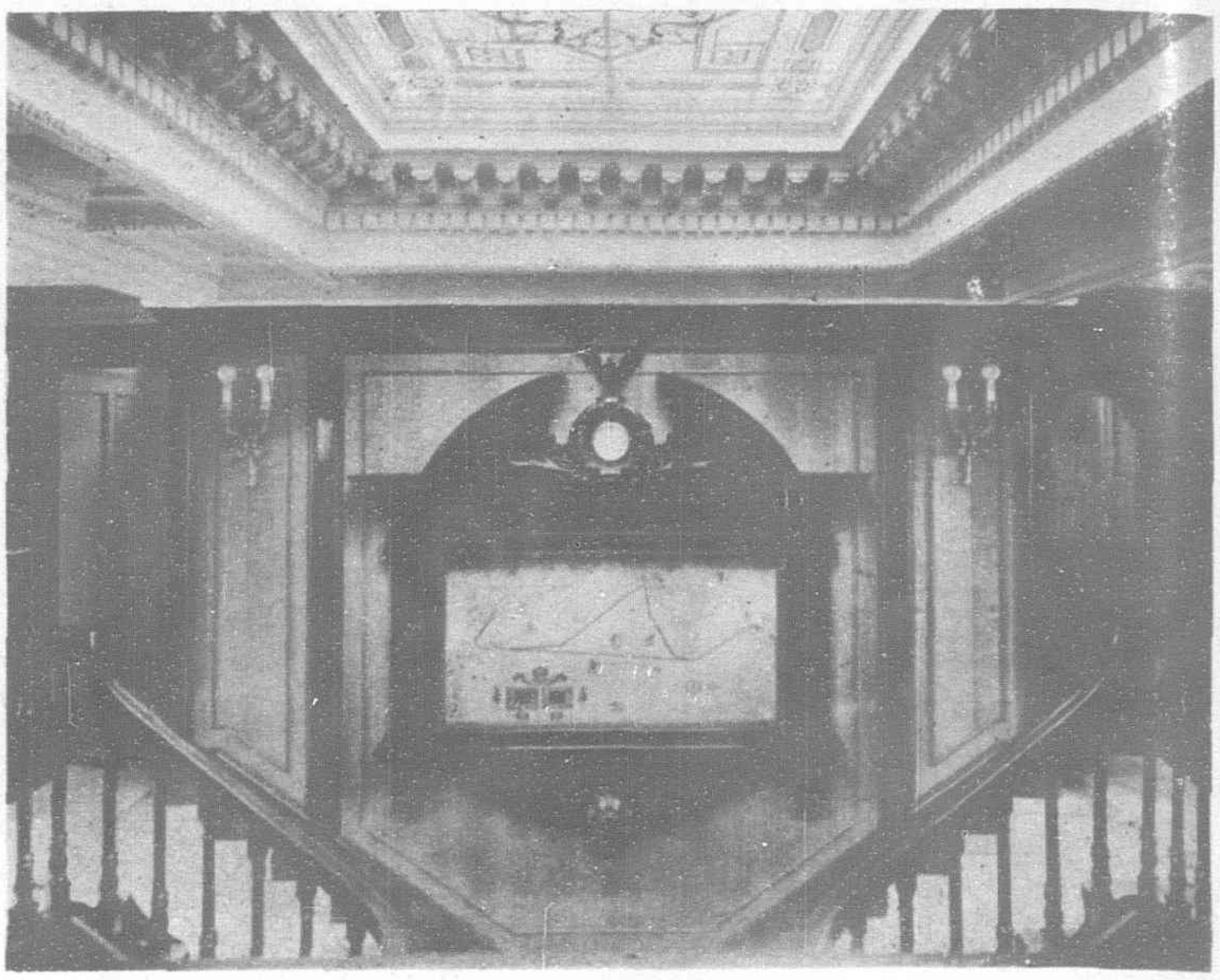
D.K.K. Liner "Choshun Maru"

Suite de Luxe

First Class Dining Room



Grand Stairway in First Class Dining Saloon



Track Indicator on Grand Stairway

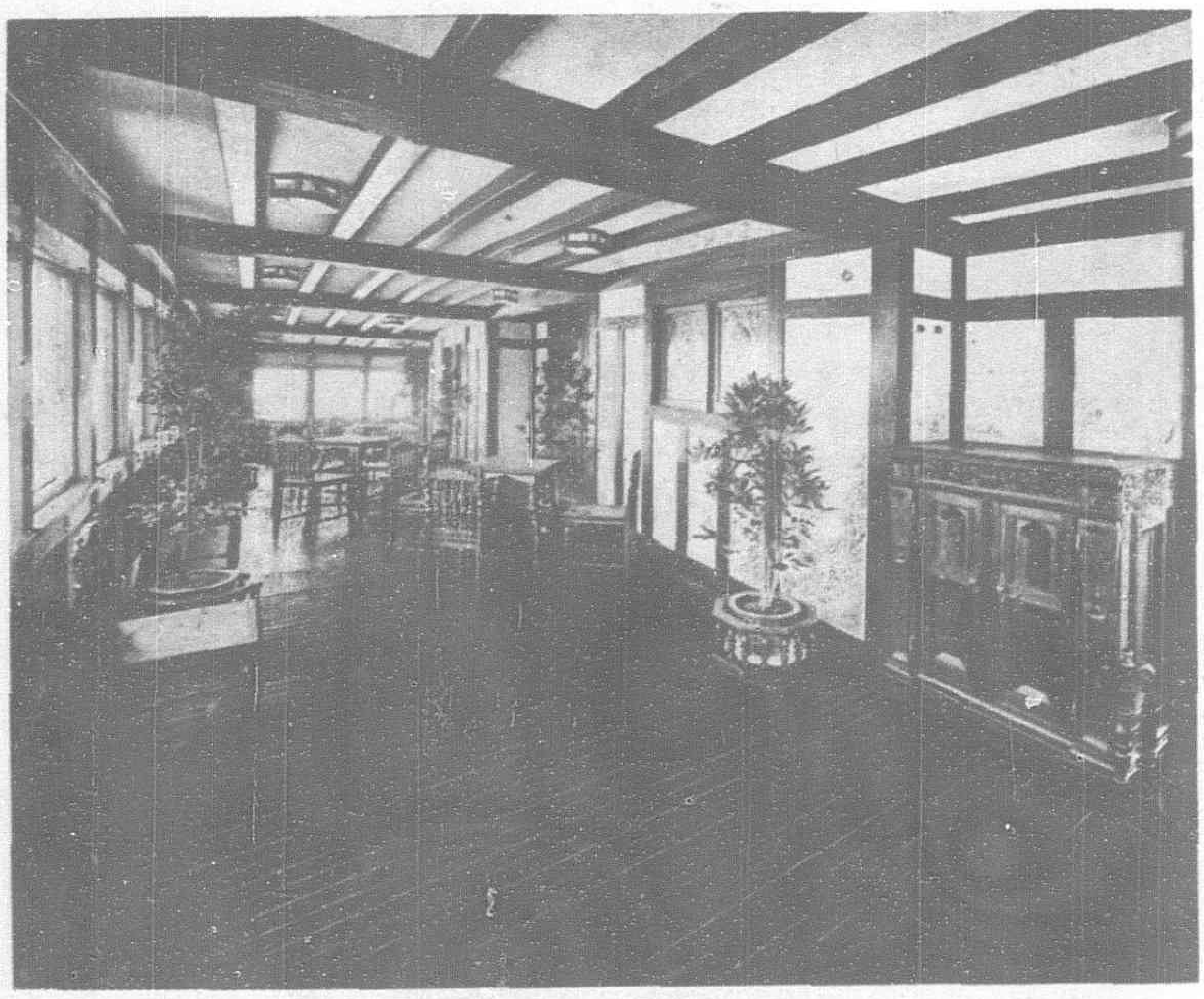
A large deck structure on the upper deck amidships houses the first class dining saloon, seven first class state rooms and seven second class state rooms, together with second class dining room and smoking room. Above this deck house is the promenade deck where such first class accommodation as the *suite de luxe*, twenty state rooms, smoking room and verandah cafe are located. A boat deck of equal length to and above the promenade deck, accommodates six life-boats equipped with the well known Welin system of davits. The wireless telegraph room is situated immediately abaft the dummy funnel. A deck house on the boat deck forward is provided for officers' cabins, and the top of this house forms the flying bridge. The forecastle on the upper deck is arranged for petty officers' rooms and the deck further aft on the upper deck provides for the third class dining room and alleys, on the top of which as a docking bridge are stowed two life-boats, one gig and one "temma," also provided with Welin's patent quadrant davits.

The third class accommodation comprising open space, lavatory and bath rooms is located on the aft part of the second deck. Arranged around the machinery casing amidships on the second deck are the cabins for the engineering staff, doctor, purser, chief steward as well as the accommodation for stewards, tallymen, oilers and firemen, besides store rooms, cold chamber, etc. while the sailors' quarters are entirely separate in the fore part of the deck.

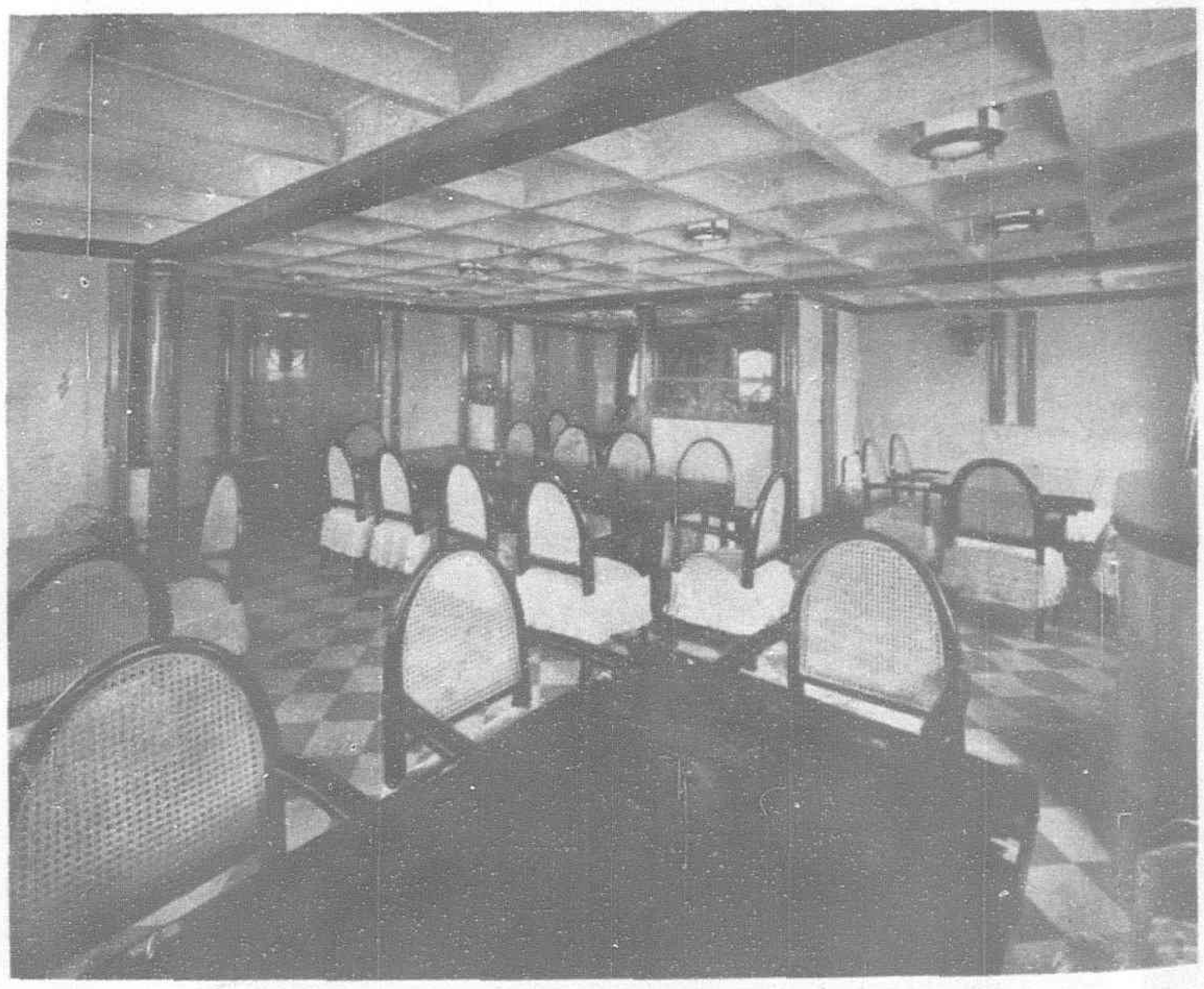
Passenger Accommodation

The greatest possible attention has been devoted to the arrangement and fitting out of the state rooms and public rooms, all of which are decorated and furnished in a tasteful and suitable manner so as to ensure the greatest comfort and convenience of the passengers.

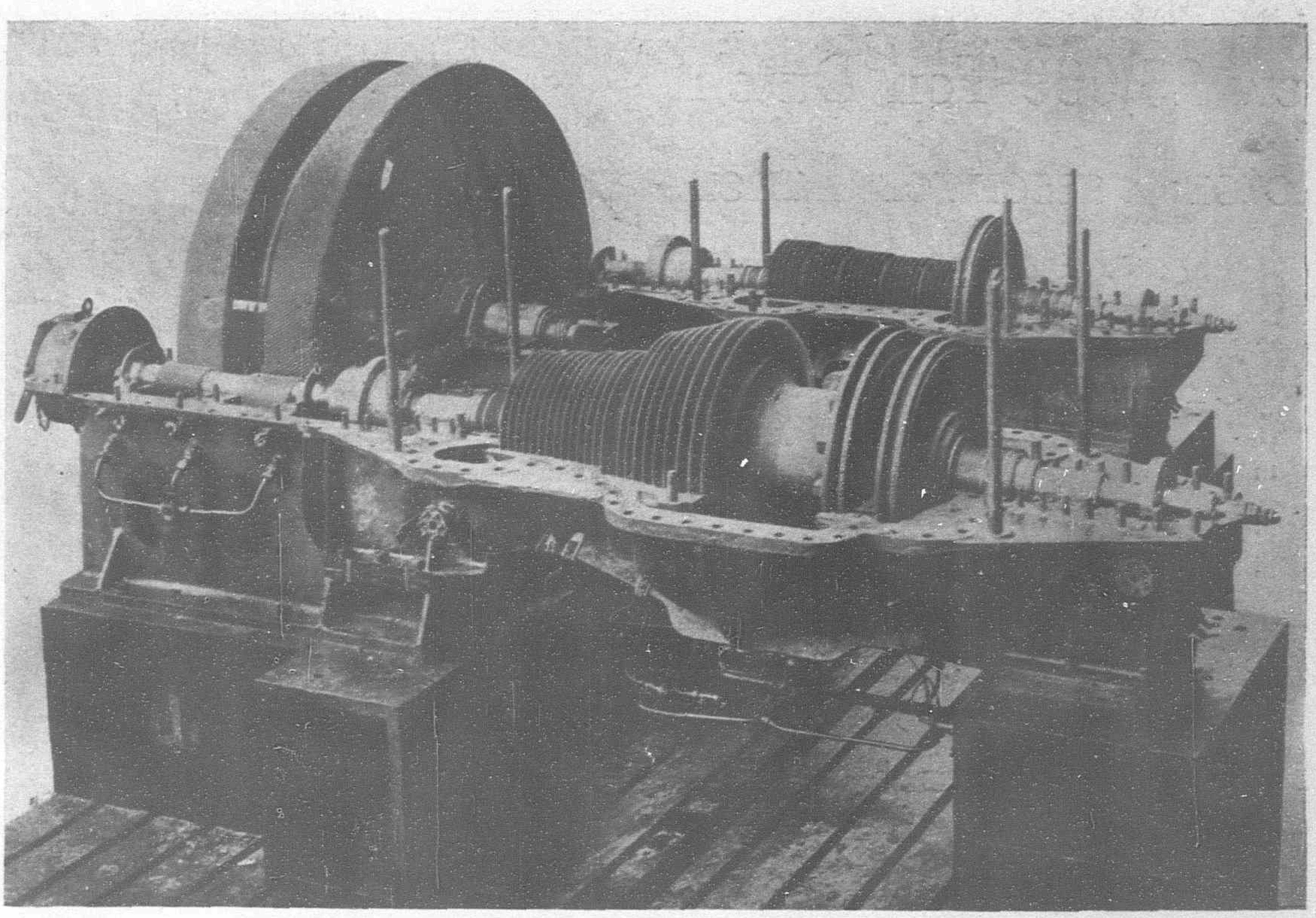
The first class dining saloon, forward on the upper deck house, extends the full breadth of the ship and is capable of seating 64 persons at one time. Extra height to the extent of about two feet has been given to this apartment. In the furnishing we have a presentation of English Georgian style. The walls are panelled and enriched in harmony with the furnishings, and a large mirror above the center side-board is fitted. The floor is of rubber tiles. Ascending by a spacious stairway from the first class dining saloon, the passenger arrives at the entrance hall on the promenade deck. At the head of this stairway, which is provided with handsome balusters and decorated hardwood rails, is mounted a handsome track indicator which shows on the chart, by means of an electric device, the exact position of the vessel at sea with every movement of the ship. The *suite de luxe* has been arranged on the promenade deck starboard side abaft the entrance hall. The sitting room and the bed-room are decorated in late Renaissance style. The floors are covered with woollen carpets. The first class smoking room is aft of the promenade deck. This apartment, the walls of which



Verandah



Second Class Dining Room



One of the Two Sets of Mitsubishi Impulse Reaction Geared Turbines Developing 4,500 S.H.P. Installed on the D.K.K.'s New Liner "Choshun Maru"

are panelled with polished hard wood, has been treated in the early Stuart style, with floors of rubber tiles. There is also a verandah cafe abaft the first class smoking room, treated in the Old English style, and provided with tables, chairs, plant stands and a talking machine. The second class dining saloon and smoking room, situated aft on the upper deck, is decorated in Modern French style, with rubber tiled floor. Two Row's patent calorifiers, one for fresh water to the lavatory basins of the first class passengers and the other for fresh water or salt water to the baths for first and second class passengers, are installed.

Deck Machinery

Steam power is utilized for driving the auxiliary deck machinery. Eight cargo winches for eight derricks, arranged for each cargo hatch on the upper deck, are designed for a lift of ten tons for No. 2 cargo hatch and three tons for the other hatches. A windlass with capstan is fitted on the forecastle deck. Electric generators are two in number, each capable of producing 25 k.w. The refrigerating machine of Mitsubishi's patent Co_2 compression multiple effect system, of special design, is of ample capacity to refrigerate the cooling chamber. The steam steering gear, capable of being worked by Brown's patent hydraulic steering telemotor from the flying bridge, is of the direct-geared type, installed in the lower 'tween deck on the aft peak tank top. The steam capstan engine is fitted on the upper deck aft, and is so arranged as to be adaptable for steering in case of emergency.

Propelling Machinery

The propelling machinery which was also designed and constructed by the Kobe Shipyard and Engine Works, Mitsubishi Zosen Kabushiki Kaisha, consists of two sets of Mitsubishi impulse and reaction geared turbines of the modern high-speed type, each set driving one of the twin propellers through single reduction gearing. The machinery is designed to develop 4,500 s.h.p, Each set consists of two turbines arranged in cross compound, there being one H.P. turbine on the inboard and one L.P. turbine on the outboard side of the vessel. The reversing turbines are incorporated in the exhaust casing of each L.P. turbine and their total horse powers are about 2,500 s.h.p. The turbines are designed on the impulse reaction principle for ahead turbines and impulse type for astern turbines, and are suitable for steam of a working pressure of 200 lbs. per square inch and for superheat of about 120°F. The main Condensers are of Mitsubishi Contraflo type, cooling surface 2,010 square ft. each and are designed for maintaining a vacuum of 28 inch at service. Steam is supplied by four sets of single-ended marine return tube boilers, 13 ft. 6 inch dia. and 11-ft. 6 inch long, designed for a working pressure of 200 lbs. per square inch. Each boiler is fitted with superheater and Howden's forced draft. Auxiliary Machinery and out-fits are as undermentioned

Mitsubishi Type Contraflo kinetic reciprocating Air pump	2 sets
Reciprocating engine driven centrifugal Circulating pump	2 ,,
Mitsubishi-Weir simplex Feed pump	3 ,,
Mitsubishi-Weir direct contact Feed water heater	1 set
,, Contraflo non-vacuum aux. condenser	1 ,,
,, Contraflo cascade Feed water filter	1 ,,
,, Weir simplex Lubricating oil pump	3 sets
Radial flow vertical Bearing oil cooler	1 set
,, ,, ,, Sprayer ,, ,,	1 ,,
Worthington vertical duplex Ash ejector pump	1 set
See's Ash ejector	2 sets
Howden's Forced draft fan	1 set
Sharples motor driven Lubricating oil purifier	1 ,,
Single cylinder vertical reciprocating engine driven D.C. Electric Generator	2 sets
Mitsubishi Multi-effect Co_2 Refrigerating machine	1 set
Worthington vertical duplex Ballast pump	1 ,,
,, ,, ,, Bilge pump	1 ,,
,, ,, ,, General service pump	1 ,,
,, ,, ,, Sanitary pump	1 ,,
,, ,, ,, Fresh water pump	1 ,,
Kent's patent Feed water meter	2 sets
Hopkinson's patent Torsion meter	2 ,,

China Under Way

Can one see the United States in the advertising pages of the national magazines ? Perhaps. But if it is a fair picture which the advertisers give, then Shanghai, except for an international flavor, is as modern as the latest skyscraper. The latest issue of the *Far Eastern Review*, published at that center of Chinese industry, provides the evidence.

Steamship lines advertise in it—three English lines, one American and one Japanese. One English shipbuilding company and two Japanese concerns seek orders. Two stevedoring and warehouse companies are Japanese. Two Swiss companies and one in Denmark offer marine Diesel engines for sale. English and Japanese docks are available. Obviously the port of Shanghai is up to date. And consider what enters that port. Iron and steel shapes show enormously, with advertisements of five American and two English companies, besides a German and a Japanese company—most of them internationally known. Boilers and steam and electric machinery are sold by ten other firms—four English, five American, a Japanese and a German. Add to that an American conveyor concern, another one selling refrigeration machinery, another selling rock drills, another selling blowers and fans—an English maker of pneumatic tools, and so on.

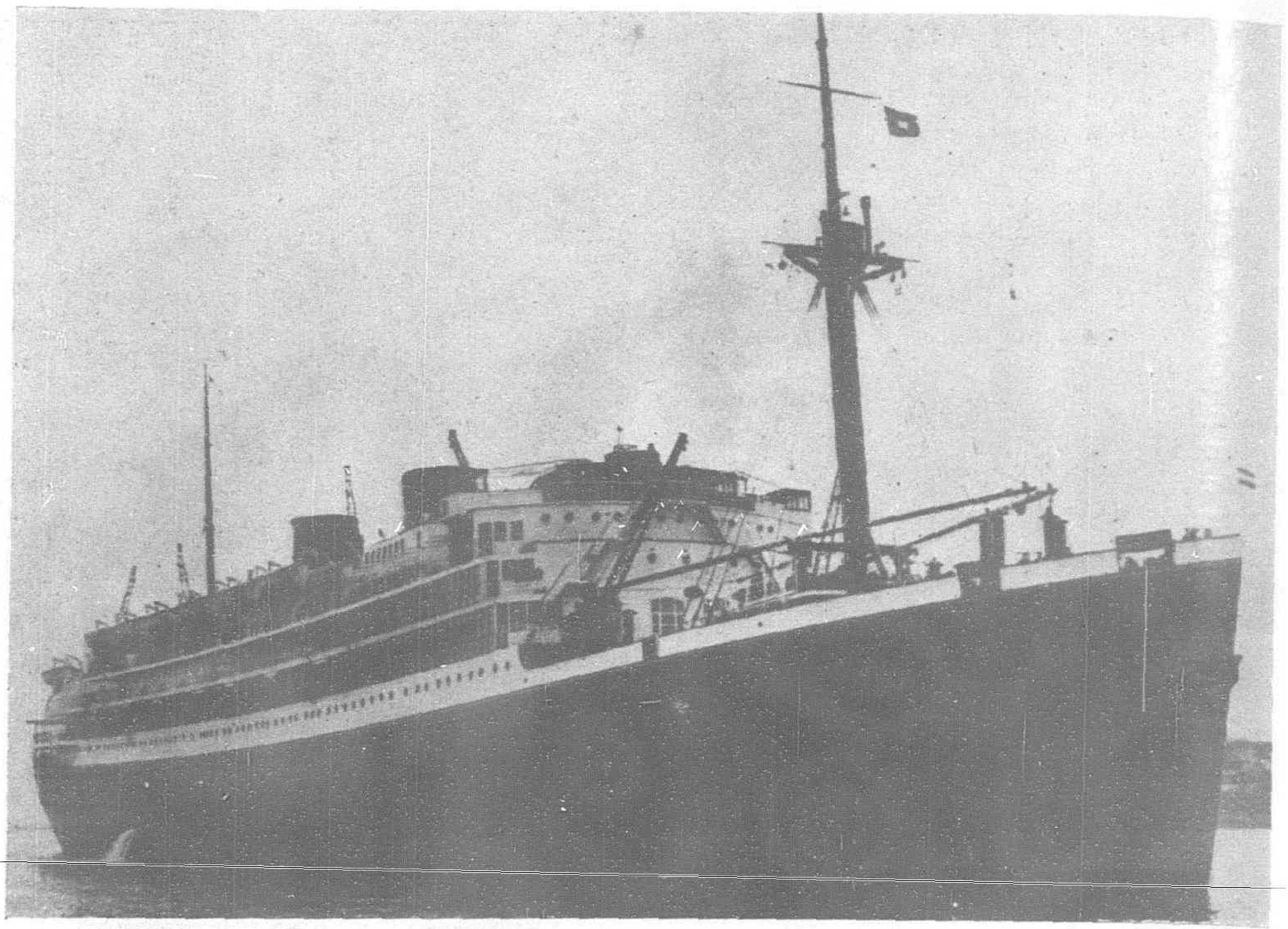
There may still be junks in the yellow Yangtze and ricshas in the narrow streets, but Shanghai speaks a modern language in public.—*Baltimore Sun.*

New 25,000 Ton Dutch Motor Passenger Liner "Johan van Oldenbarnevelt"

Built by the

Netherlands Shipbuilding Company of Amsterdam

For the Dutch East Indies Service of the
Netherland Steamship Company

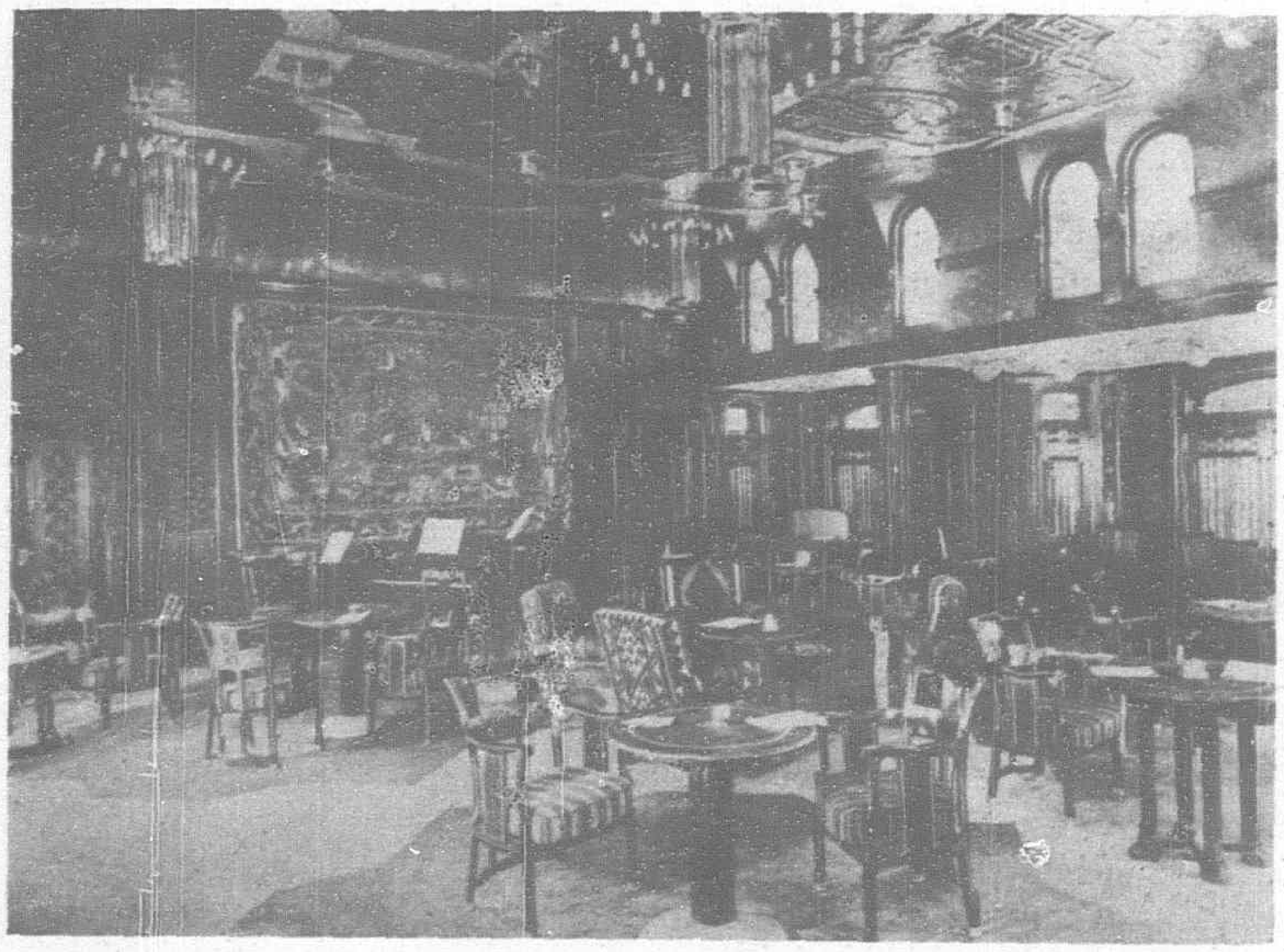


Motorship "Johan van Oldenbarnevelt," 19,000 B.R.T. Two Ten-cylinder Sulzer, Two-cycle Marine Engines, Totalling 14,000 B.H.P.

De Luxe Cabin on M.S. "Johan van Oldenbarnevelt"

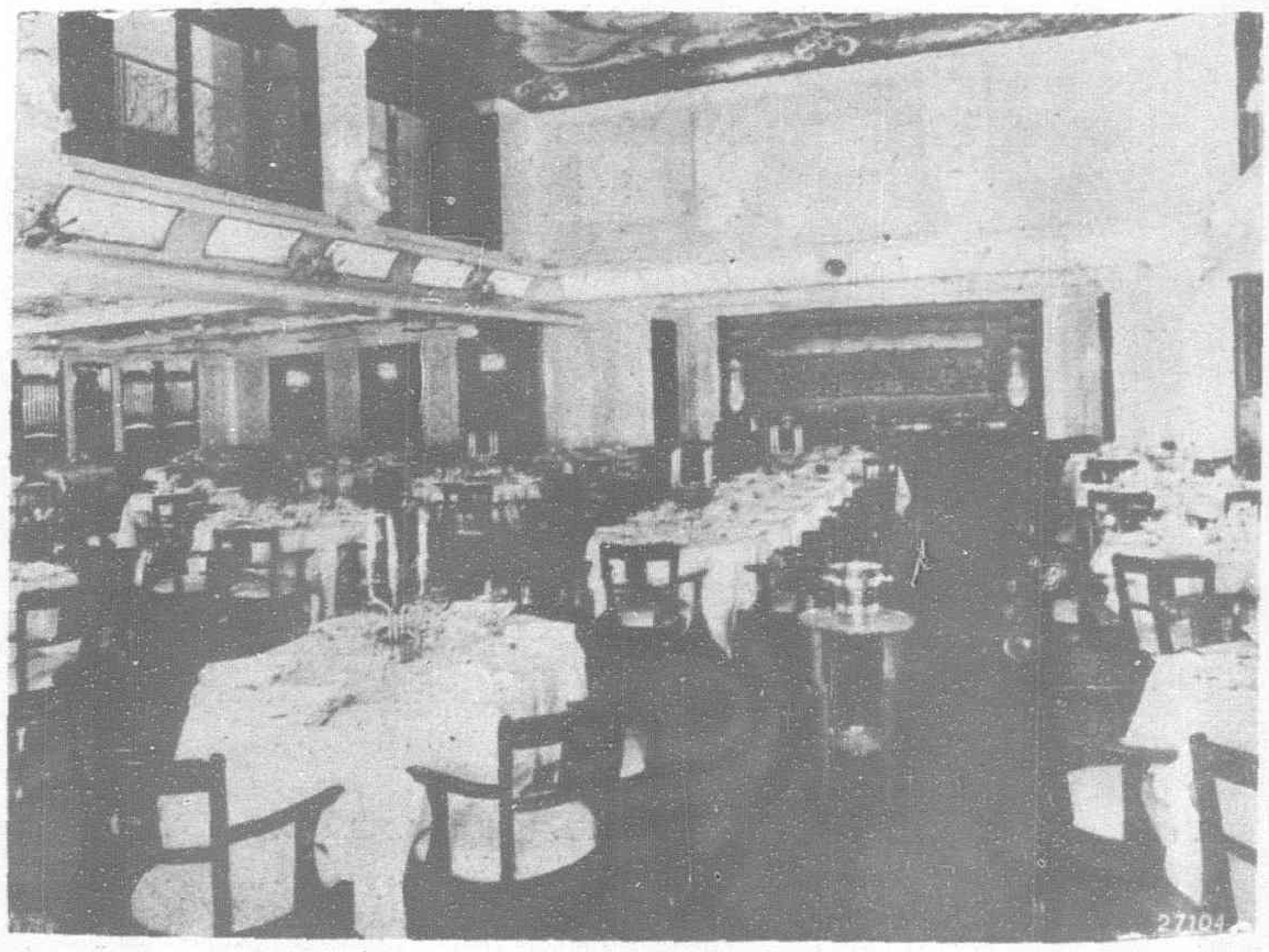
The Stoomvaart Maatschappij Nederland (Netherland Steam Ship Company), Amsterdam, put a new passenger motorship, the *Johan van Oldenbarnevelt*, in service in the first half of 1930. The vessel is a sister ship of the *Marnix van St. Aldegonde*, which is at present under construction, and both are representative of the development which has taken place since 1925 in the type of vessel employed on the services to the Dutch East Indies. In that year, the big Dutch shipping concerns for the Dutch East India service commenced using Diesel engines for ship propulsion, and since then the new ships they have placed in service are only motorships.

The two new ships differ from the previous passenger motor vessels owned by the company, not only in their size, but above all in their higher speed. Whilst the size of the previous passenger motor vessels has constantly increased in the course of years, they have up to now had about the same speed as the passenger steam ships of the company. The reason for increasing the service speed to 18 knots lies on the one hand in the increasing employment of faster cargo motorships in recent years, and also in the fact that the advantages of Diesel engine drive are best utilized when



First Class Social Hall

M.S. "Johan van Oldenbarnevelt"



First Class Dining Room

the time required for the round trip is shortened.

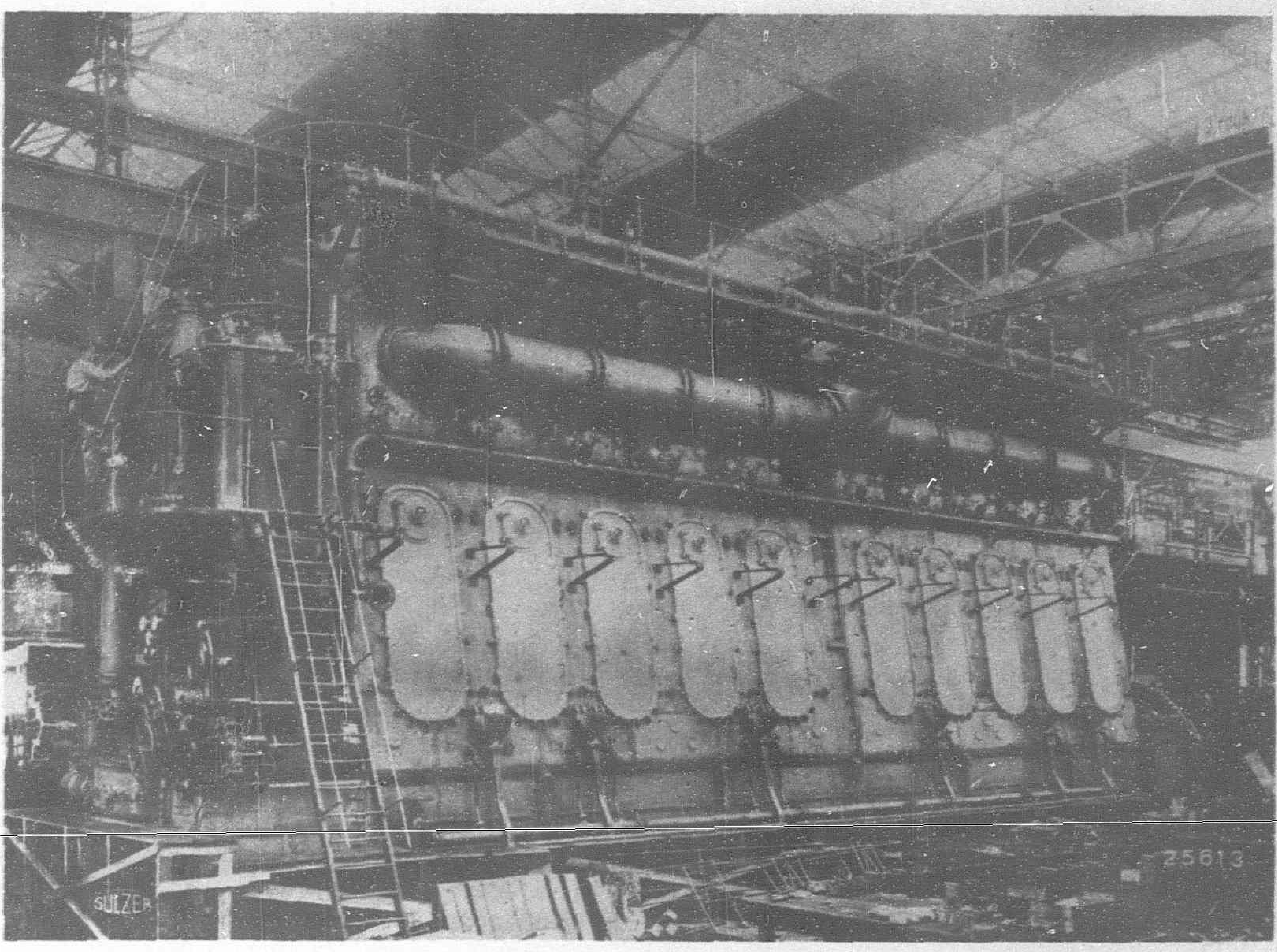
The motorship *Johan van Oldenbarnevelt,* which is named after the well-known Dutch statesman of the sixteenth century, passes through the tropics for the greater portion of its usual run, for this reason the rooms for the accommodation of the passengers are located as high as possible above the water-line, so as to enable the port holes to be kept open even during bad weather.

The exterior appearance of the ship is characterized by the slanting bow and the cruiser stern, as well as by the lengthy superstructure and the arrangement of the masts and funnels, the whole presenting a compact and sturdy impression.

The principal dimensions of the ship are as follows :—

Length overall	575-ft.
,, between perpendiculars	580-ft.
Beam over frames ...	74-ft.
Height . up to E-deck ...	39-ft.
,, ,, ,, C-deck ...	55-ft.
Tonnage	19,000 register
Displacement in sea water at 28¼-ft. draught	25,300 tons
Speed	18 knots
Horse power	14,000

Passengers carried :	first class	245—300
	second ,, ...	246—367
	third ,, ...	64— 99
	fourth ,, ...	48

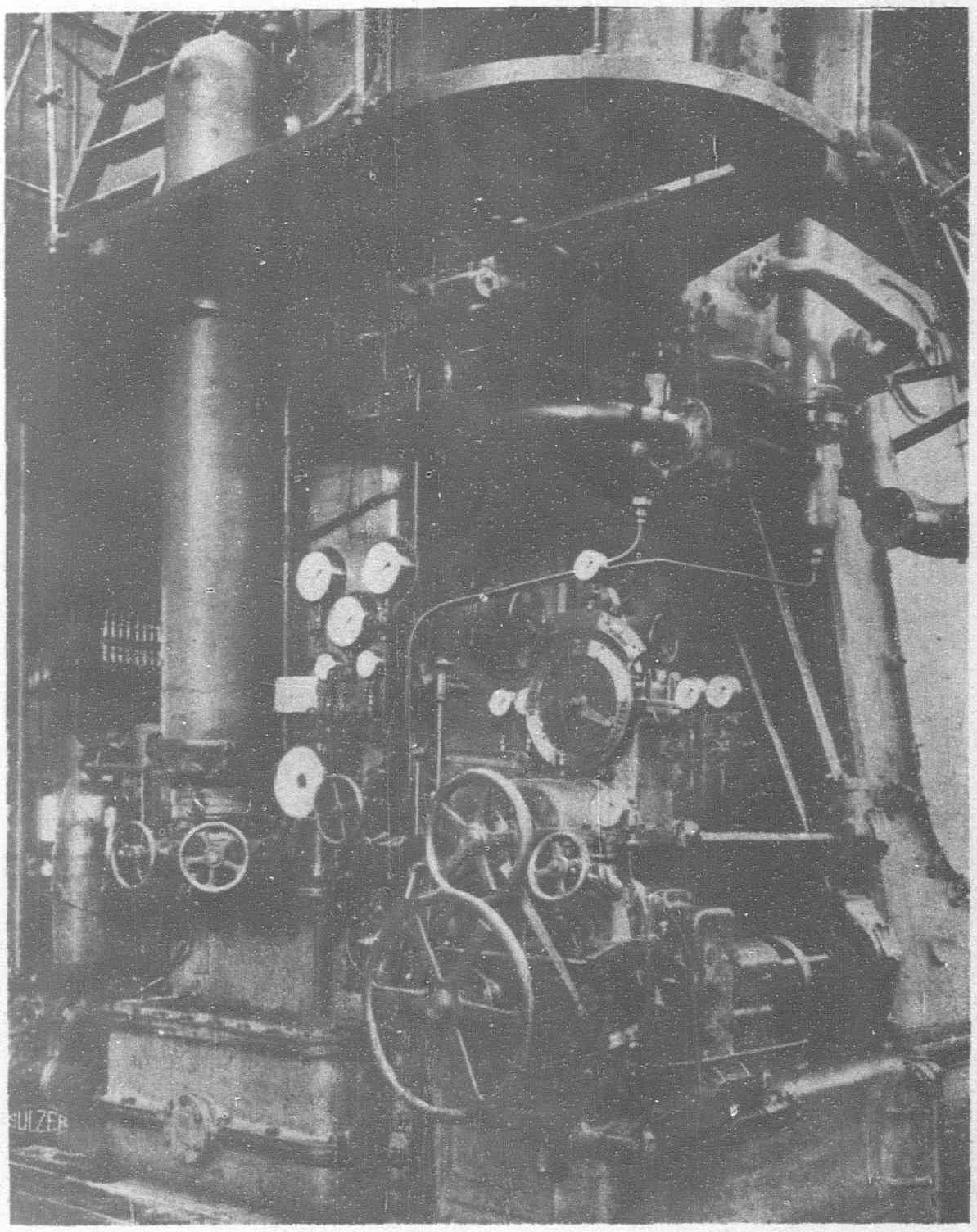


Main Motor of M.S. "Johan van Oldenbarnevelt," Erected in One of the Assembling Shops of Sulzer Brothers, Winterthur. Normal Output 7,000 B.H.P. at 100 Revolutions per Minute, Directly Driven Compressor and Electrically Driven Turbo Blowers for Scavenging

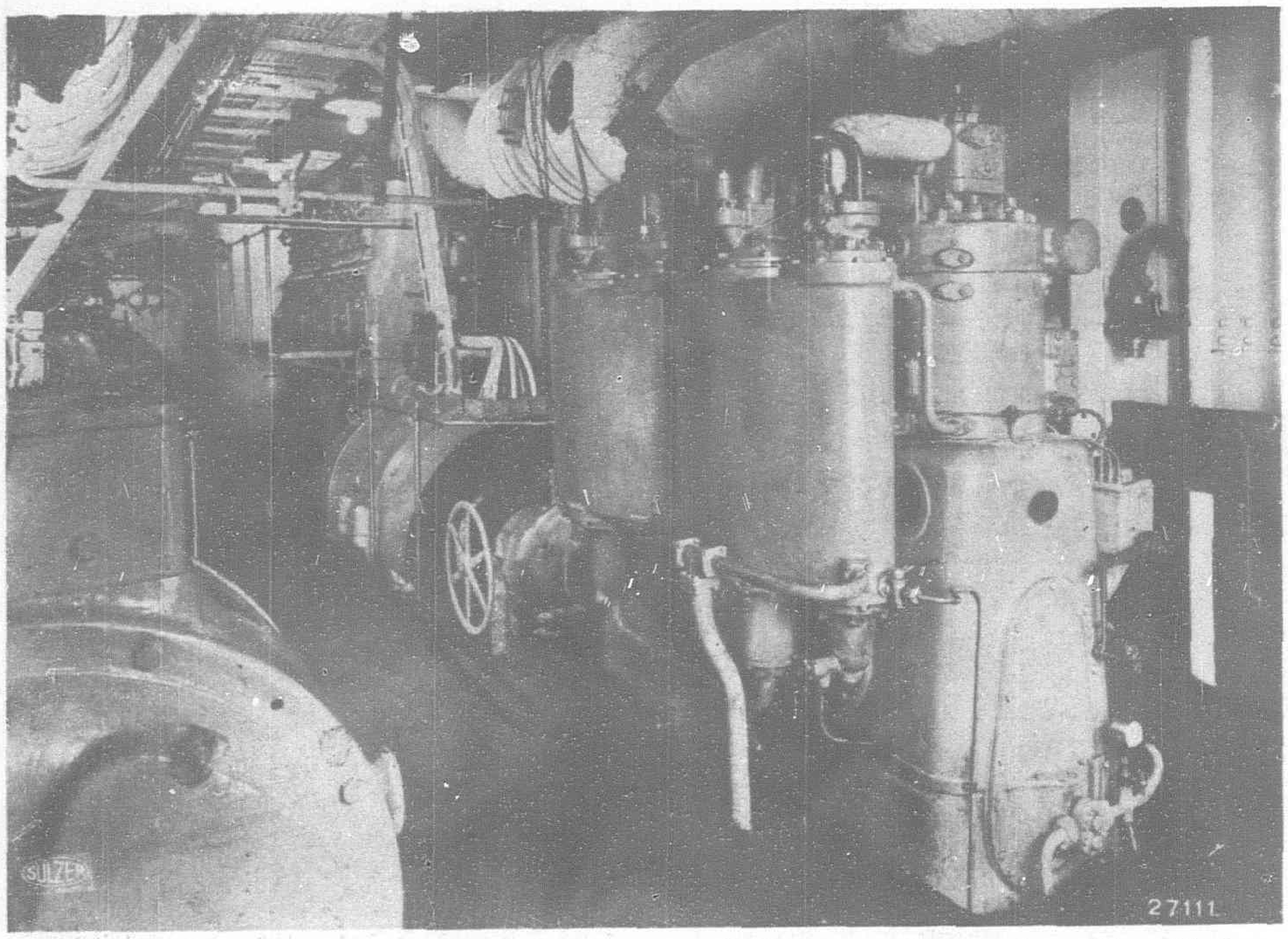
Construction

The motorship was built by the Nederlandsche Scheepsbouw Maatschappij (Netherlands Shipbuilding Co.), Amsterdam, in accordance with the stipulations of the highest class of the Bureau Veritas classification I 3/3 L, and complies with the regulations of the International Covention for Safety at Sea, as well as with Dutch legal regulations. The double bottom extends from the forepeak to the aftpeak and is divided into twenty water-tight compartments. In addition to the forepeak and aftpeak, the compartments in the double bottom fore and aft are used for the storage of fresh water, whilst the compartments midships are used principally for ballast water. One compartment is arranged as a storage and settling tank for 105 tons of fresh water for cooling the motor installation, whilst there is also a tank for lubricating oil with a cofferdam round it, built underneath the main engines. Fresh water is also stored in the side tanks under the provision rooms and in the tanks between the shaft tunnels. The oil bunkers extend from the double bottom to H-deck, and are divided by a number of oil-tight bulkheads and partitions into sixteen tanks, two of which are settling tanks. A connecting tunnel from the engine room to room No. 2 leads through the oil bunkers and the adjoining deep tank in room No. 3, which also extends from the double bottom to H-deck.

Below E-deck—the bulkhead deck—the ship is divided into ten separate compartments by nine water-tight bulkheads, sixteen water-tight doors being provided to close the necessary apertures in the bulkheads. The upper doors can be operated from either side of the bulkheads, and if necessary, by hand from E-deck also, while the three lowest doors—those in the engine room leading to the shaft tunnels, the connecting tunnel, and the entry to the cold rooms—can be closed hydraulically from the bridge. Fireproof partitions are provided in the superstructure, with openings which may be closed by means of fireproof doors. Their arrangement is especially noteworthy, inasmuch as these partitions, and some of the other steel walls of the bathrooms, etc. constitute in almost every case a direct continuation of the main bulkheads in the lower part of the vessel. The result of this arrangement is that the superstructure is particularly well stiffened, so that it is fully capable of taking its share of external strain, whilst at the same time the weight of steel in the superstructure is lighter on account of there being no ribs or other constructional details for stiffening purposes, which would



Control of One of the 7,000 B.H.P. Diesel Engines for M.S. "Johan van Oldenbarnevelt"



Auxiliary Compressor for M.S. "Johan van Oldenbarnevelt." Sulzer Six-cylinder Two-cycle Diesel Engine with Solid Injection, Output 330 B.H.P., Coupled with a Dynamo and with a Sulzer Four-Cylinder Auxiliary Compressor

otherwise be necessary for continuing the water-tight bulkheads.

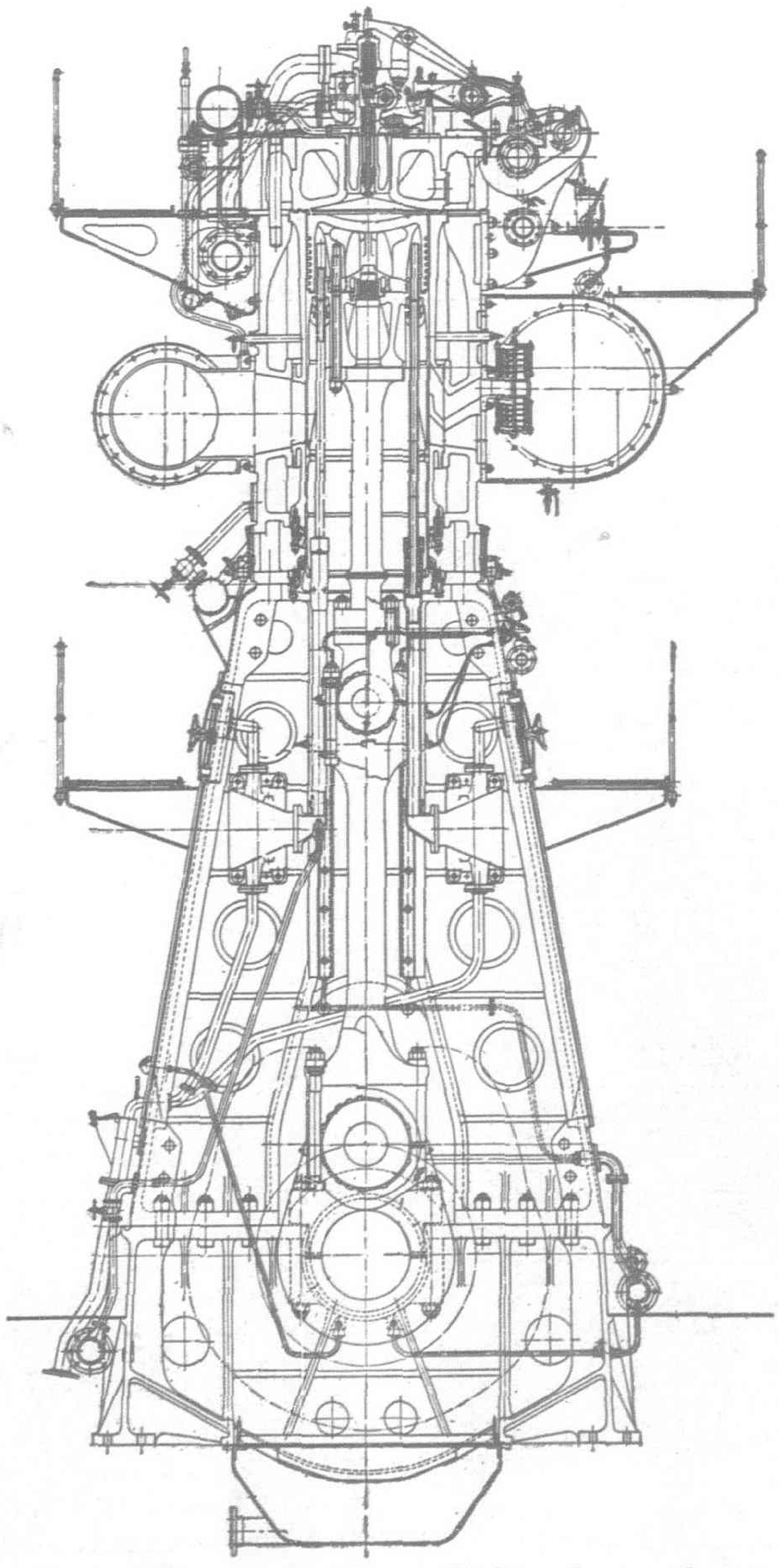
Passenger Accommodation

Spacious staircases afford connection between the individual decks, special staircases being provided for each class, whilst there is also a lift for first-class passengers which provides connection up as far as B-deck. The service gangway on B-deck and some stairways for the crew enable the ship's routine to be maintained without interfering with the passengers. The number of passengers which may be carried is 245 to 300 first class ; 246 to 367 second class ; 64 to 99 third class, and 48 fourth class, whilst the crew numbers 360 men, including 140 Javanese servants.

The amount of space available to passengers in the first and second classes is approximately equal. The social rooms are concentrated on C-deck, so that over their whole extent their height exceeds that usually found on board ship, and thus forms a characteristic feature of the vessel. The windows in the rooms on this deck reach almost to the floor, and can be fully opened, thus enabling the rooms to be kept pleasantly cool even in the hot weather in the tropics. Their appointments are carried out in an up-to-date style conforming to present-day developments in shipbuilding.

The cabins, as in the case of the public rooms, have been appointed with special consideration to voyages in the tropics, and all cabins are outer ones without exception. The two staterooms on B-deck will be dealt with first of all, when describing the first-class cabins ; shown in the illustration on page 522 are provided with a private bathroom and also a closed-in portion of the deck specially set apart for the purpose. The furniture and woodwork consists of polished mahogany, the walls being covered with cloth. The other first-class cabins are either single or double, and all are provided with windows on the outside. The appointments of all cabins include a proper bedstead, or bedsteads as the case may be ; a desk with an armchair ; a wardrobe for each passenger, one of them with a mirror ; a wash basin with glazed basin and taps for fresh water. The doors and furniture are of polished mahogany, with the walls and ceiling enamelled white. A large number of interchangeable compartments first and second class are provided ; they are fitted out in the same way as first-class cabins, but are provided with an additional upper berth.

The second-class cabins are likewise comfortably appointed, and can accommodate either two or three passengers. A point of difference between them and the first-class cabins is that they have the customary fixed berths, and a folding table in place of the desk.



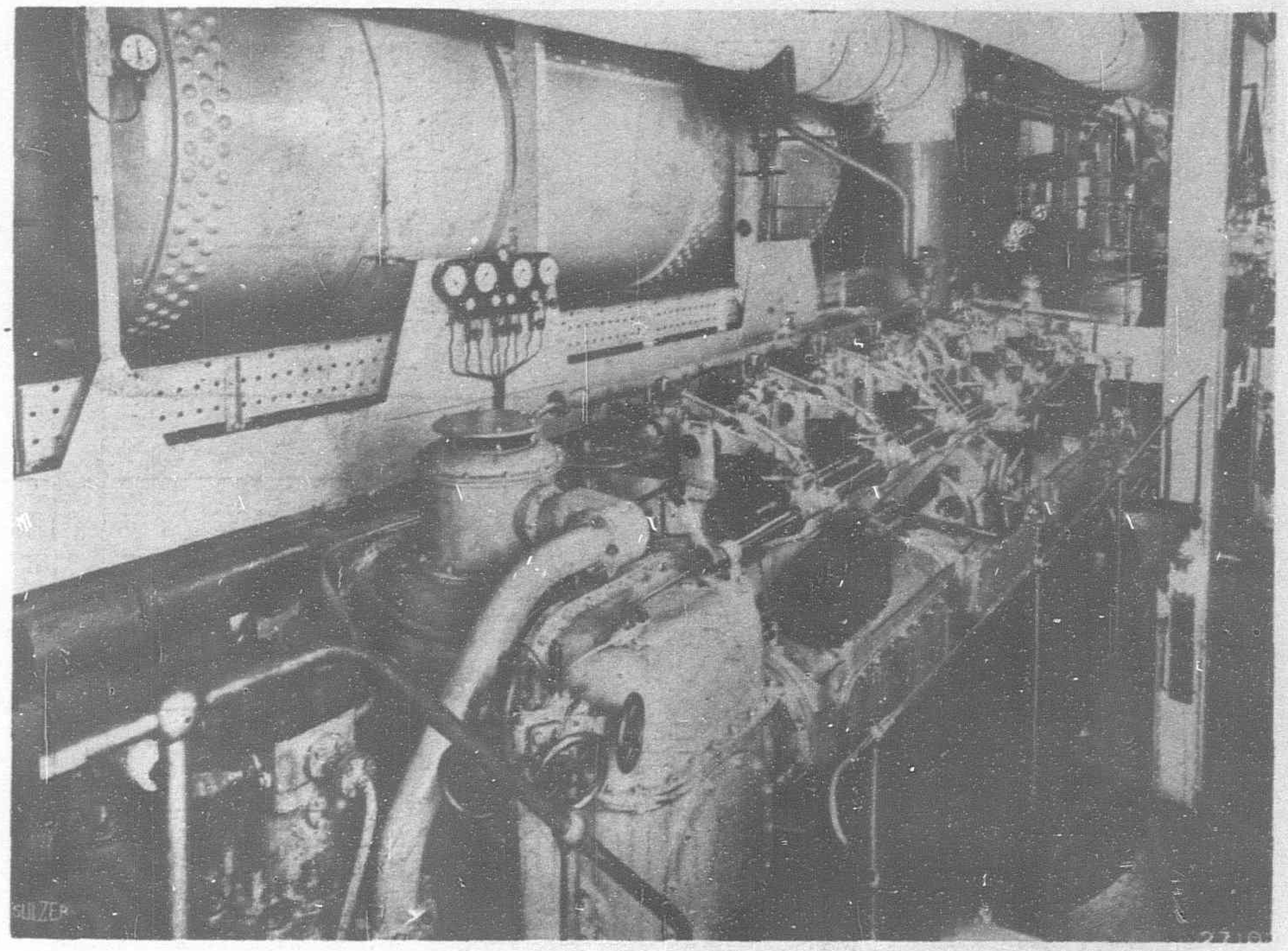
Section through working cylinder of one of the 7,000 B.H.P. Diesel engines for M.S. "Johan van Oldenbarnevelt."

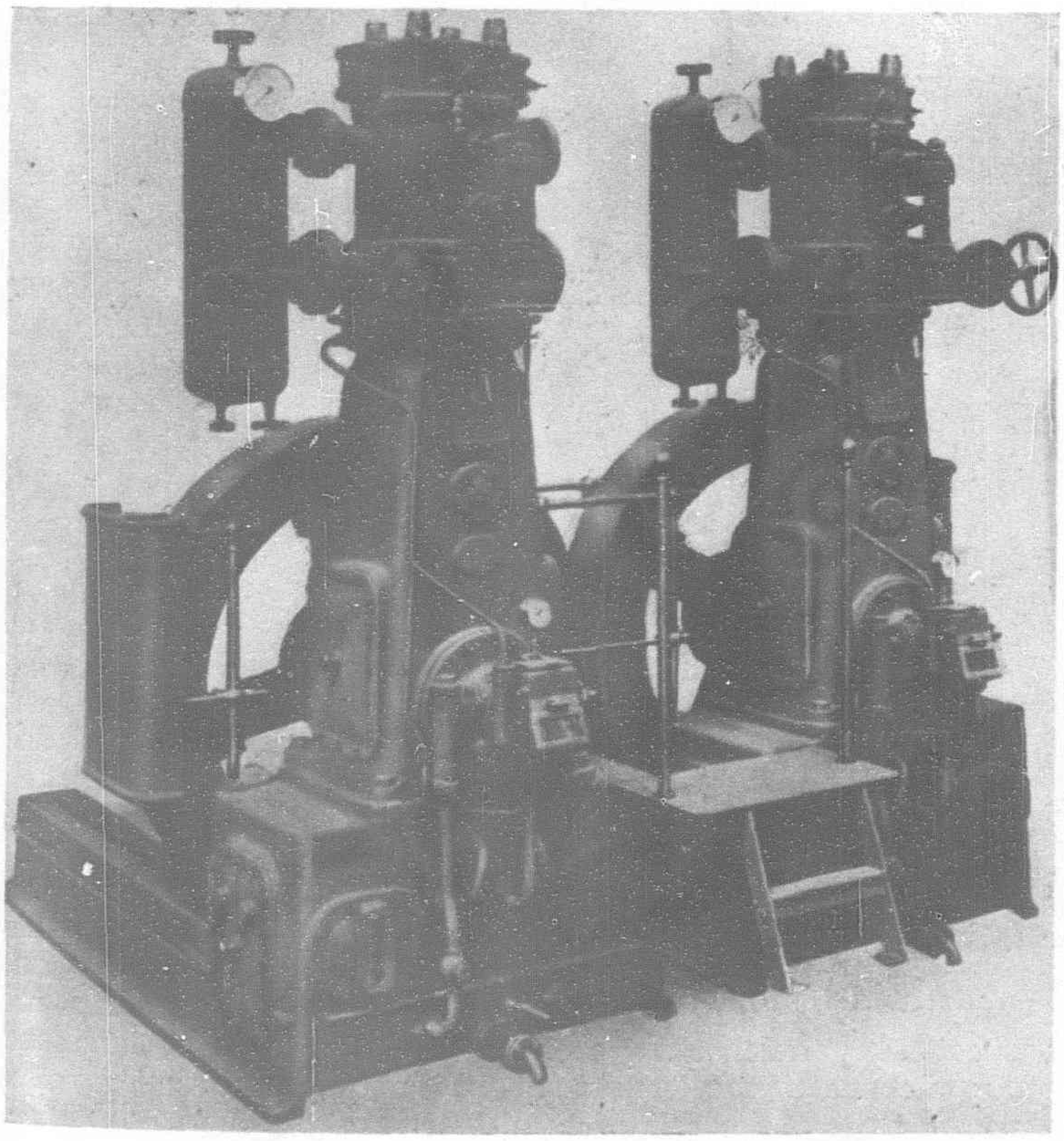
Main Engines

The Diesel engine plant is characterized notably by its shortness, as, in contrast to other ships of similar power which are provided with an auxiliary engine room as well as main engine room, there is, on the *Johan van Oldenbarnevelt* one engine room only, containing all the auxiliary engines as well as the main engines. The result is that the total length of the engine room is only about 95-ft., and thus it was possible to arrange for the supply of fuel to be carried in an inter-connected group of bunkers on top of the double bottom, as in the case of previous motorships owned by this company, without detriment to the total amount of loading space available. Such bunkers possess considerable advantages over the utilization of compartments in the double bottom as bunkers, particularly in the case of heavy oils, on account of the arrangement of the heating pipe elements, as well as for technical reasons connected with cleaning them.

The installation also calls for a minimum amount of space so far as height is concerned, and this is a very desirable feature in the case of passenger vessels. As the height of the main engines is low, the engine room passes through the two lower passenger decks only, and then takes up only a comparatively narrow space amidships as well, so that there is ample space left on both sides of the engine room shaft to permit of the passenger accommodation being extended without interference. It is very noticeable to see how little the free formation of the decks is disturbed by the machinery space, in contrast to a steam-driven vessel. In the upper decks the engine room shafts take up very little space indeed—actually only a few square yards—so that the advantages of Diesel engine propulsion for passenger ships are very distinctly demonstrated in the case of the motorship *Johan van Oldenbarnevelt*.

The engines were supplied by Messrs. Sulzer Brothers, of Winterthur, Switzerland, and consist of two single-acting-twocycle main engines, each having ten cylinders of 760 mm bore and 1,340 mm stroke. The normal output of the two engines together is 14,000 H.P. at 100 revs. per min. They reveal various noteworthy features in their construction. Up to the present the ten cylinder arrangement has been little used; it renders possible, however, especially in two-cycle engines, a very regular turning moment, owing to the small variations in the tangential force diagram of this type of engine, and provides, together with the characteristic stiffness of build which is a feature of Sulzer engines, absolutely smooth running. No vibration whatever was noticed on the trial run, either when manoeuvring or running at different speeds. The very simple external appearance of the engines is primarily due to the Sulzer system of port scavenging, which enables the engine to operate satisfactorily with the absolute minimum number of moving parts, such as valve gear and similar parts. Both this feature, and also the excellent scavenging, guarantee a high degree of satisfactory operation. With an engine of the length in question, and in the interests of uniform operation of the valves of all the cylinders, the valve gear drive has been shifted to the middle of the engine, between cylinders Nos. 5 and 6, the vertical shaft being driven from the crankshaft by means of bevel gearing. The valve operation itself is unaltered, although in addition to the servo motor for starting up there is a second one provided for working the reversing wheel. These servo motors are driven by compressed air, and their regulating valves are operated by means of the starting and reversing levers arranged on the control platform. An interlocking device prevents both levers being shifted simultaneously, so that, for example, when reversing, the starting rod must first of all be turned back to the "Stop" position before the reversing lever can be manipulated. The fine adjustment of the stroke of the needle can be effected by hand at the reversing wheel; a special lever is provided for adjusting the supply of fuel, this lever having a fine adjustment. When manoeuvring, the mechanical operation enables each of the main engines to be attended to by only one engineer, and for this reason the fuel pumps are also arranged so as to be directly accessible from the control platform, at the same time being driven from the compressor crankshaft.

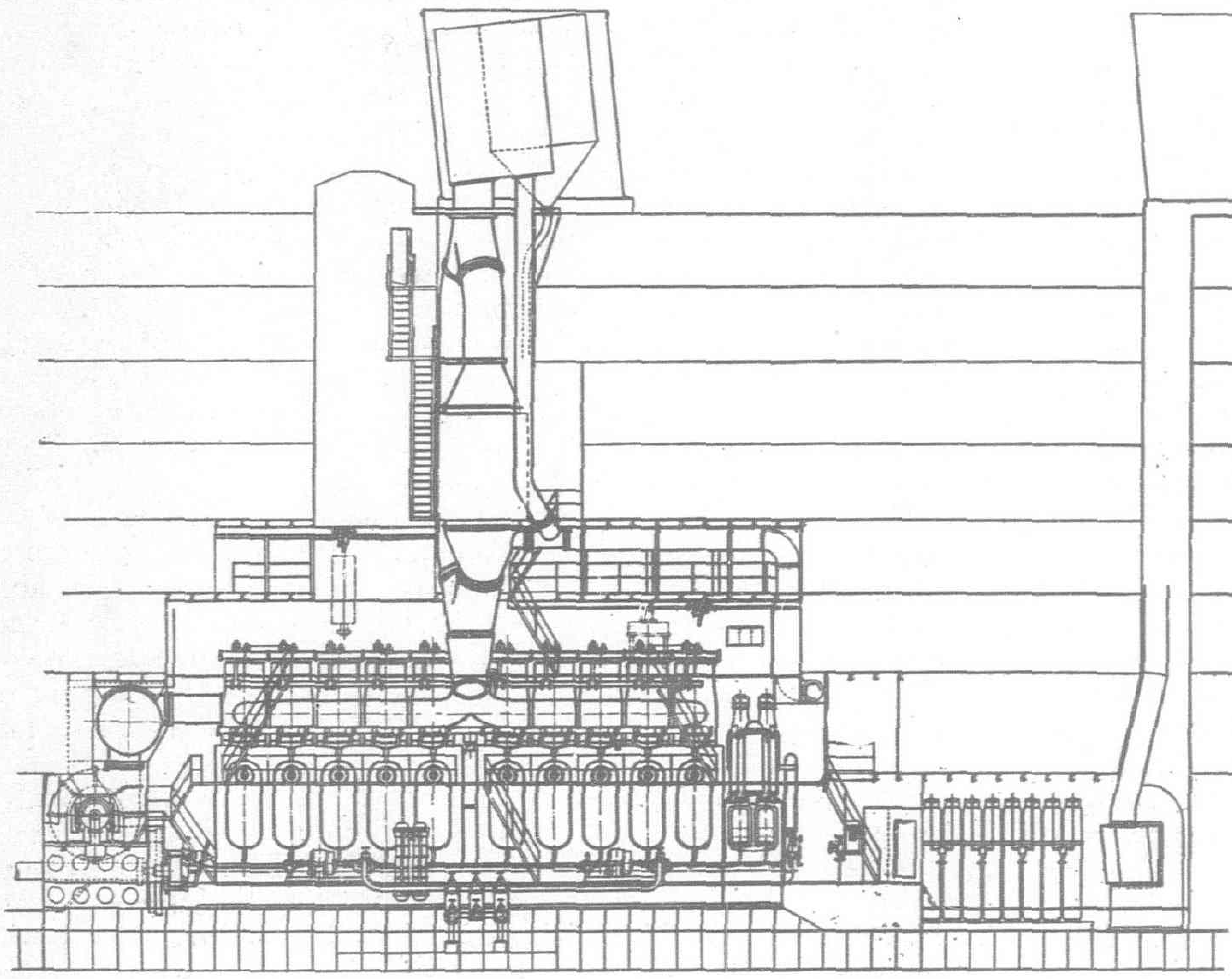

One of the Sulzer Six-cylinder Auxiliary Diesel Engines for M.S. "Johan van Oldenbarnevelt." Output 780 B.H.P.

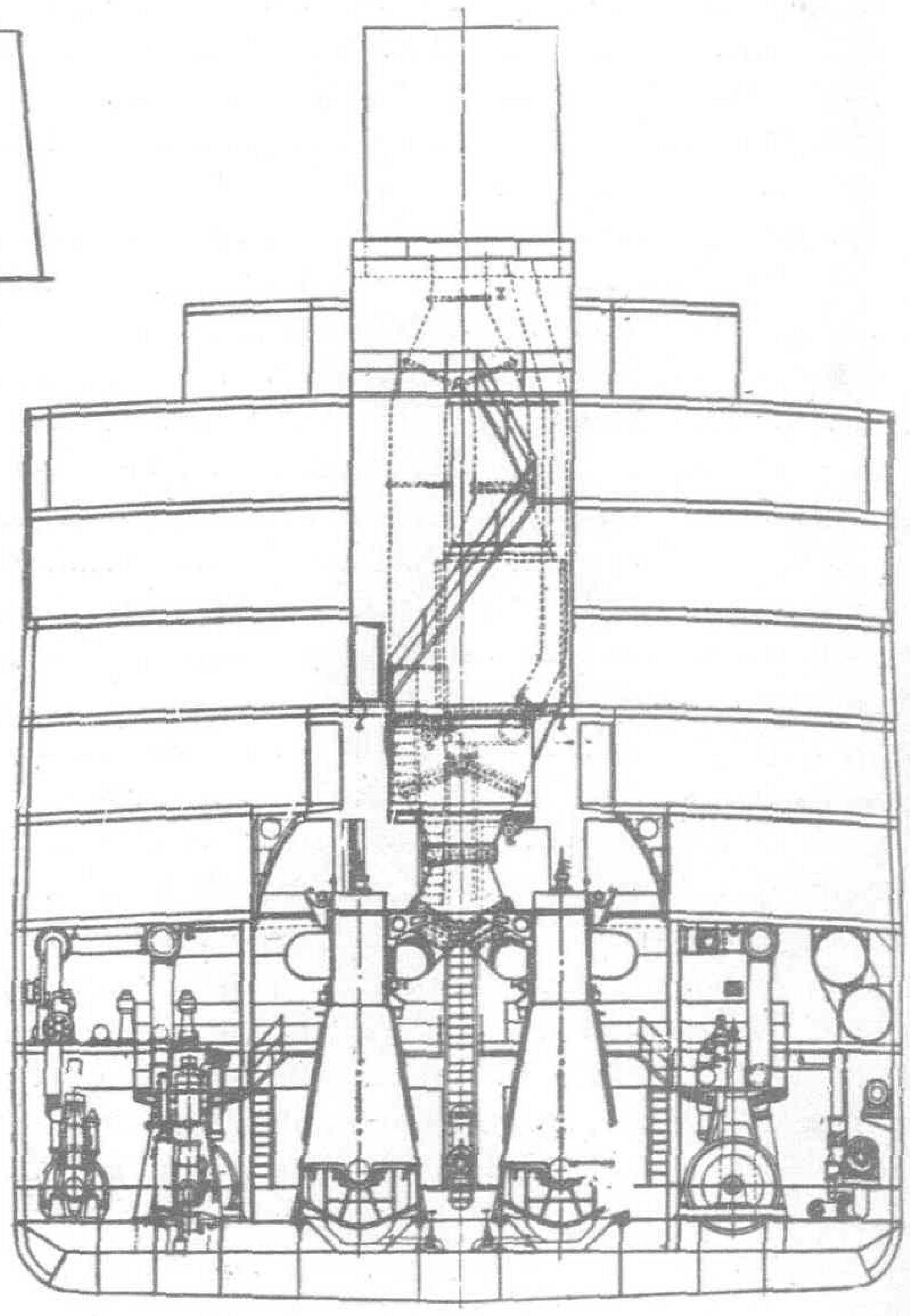

Sulzer Compound Ammonia Compressor for the Refrigerating Plant on M.S. "Johan van Oldenbarnevelt," Output 240,000 B.Th.U. per Hour, with an Evaporating Temperature of—15°C and a Cooling-Water Temperature of + 32°; 320 Revolutions per Minute

The arrangement for cooling the cylinders is also noteworthy, the cooling-water for the cylinders being supplied through a main pipe which extends the whole length of the engine; from this pipe there are two branches to each cylinder, one to the top of the jacket and the other bottom. The supply to the lower end of the cylinders is controlled by a valve. This feature is particularly valuable in the case of voyages in the tropics, as large quantities of cooling-water can be delivered to the upper part of the cooling jacket by throttling the supply to the lower portion, according to the temperature. The cylinder covers with the fuel valves and the cylinder jackets of the main engines are provided with fresh-water cooling at the special request of the shipping company. The fresh water circulates continually in a closed circuit and thus contains no impurities of any description and only a small amount of air, so that both the formation of scale and also any likelihood of corrosion are obviated from the outset. In the case of cooling by means of sea water, frequent cleaning of the cooling jackets could not be avoided, especially where the company's vessels pass through muddy water, and it must also be taken into consideration that, in order to adhere strictly to the time-table, the engines are in many instances running for lengthy periods with overload. Such cleaning can, however, only be carried out while the ship is lying in port, and in the case of the vessel described, the time spent in port is very limited indeed, owing to the brief period allowed for the turn round; the shipping company were consequently very anxious to eliminate maintenance work as much as possible. For this reason, the company decided to have fresh-water cooling for the cylinder heads and jackets of both the main engines as well as of the auxiliary engines. The pistons of the main engines, however, are cooled with sea water, as no scale can deposit in these rapidly moving parts with the Sulzer system of injection cooling.

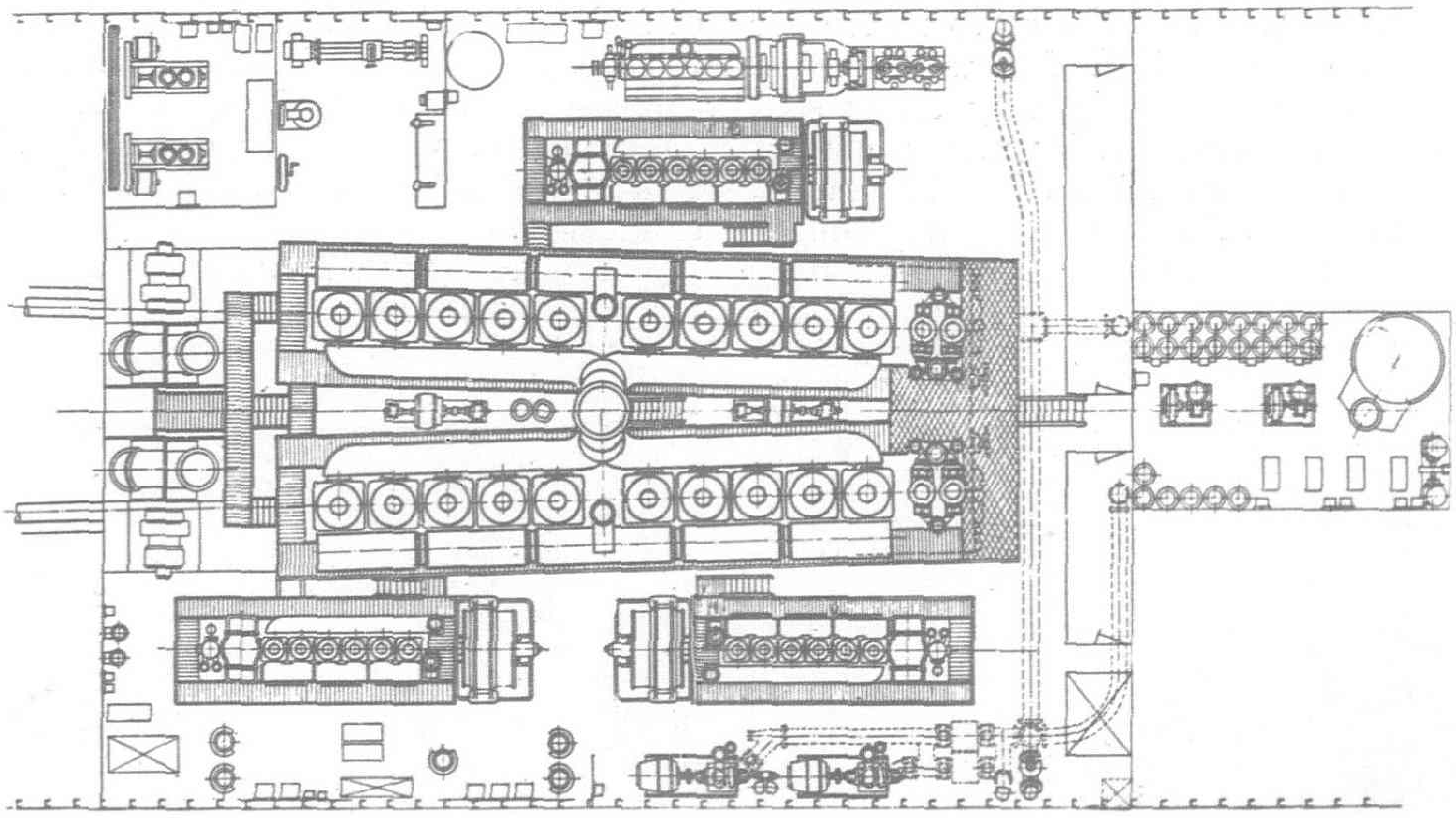
In view of the favorable results the shipping company have had on their other ships with sea-water cooling exclusively, they have decided not to abandon this system on the freight vessels now being built. In the case of passenger vessels, however, the somewhat higher outlay for fresh-water cooling plays a less important part, and is more or less compensated by the reduction in maintenance charges effected by adopting this system.

Each main engine drives its own injection-air compressor, as well as its fuel pumps and a bilge pump for 20 tons of water per hour. The incorporation of two compressor cylinders on each main





engine is chosen in the interests of absolutely vibrationless running, since the forces and moments arising from the compressors are fully compensated by arranging their cranks at 180 degrees. The compressors are three-stage, although only the first stage is double-acting. The compressor cylinders as well as the Diesel cylinders are provided with lanterns in order to prevent the cylinder lubricating oil passing into the crankcase.



Plans of Motor Room on M.S. "Johan van Oldenbarnevelt"

The scavenging air for the main engines is supplied by two turbo blowers, although one blower is fully capable of dealing with all requirements, even when both engines are working at overload, so that the second blower can be kept in reserve. These blowers are accommodated in special sound-proof rooms behind the main engines, but their driving motors are outside, so as to provide accessibility. The air is drawn from the engine room, and compressed into a large receiver arranged thwartships, the scavenging air receivers of the main engines being connected thereto. The maximum output of the blowers is 67,000 cub. ft. per min. at a speed of 2,250 revs. per min. The electric motors have a maximum output of 550 k.w.

Auxiliary Machinery

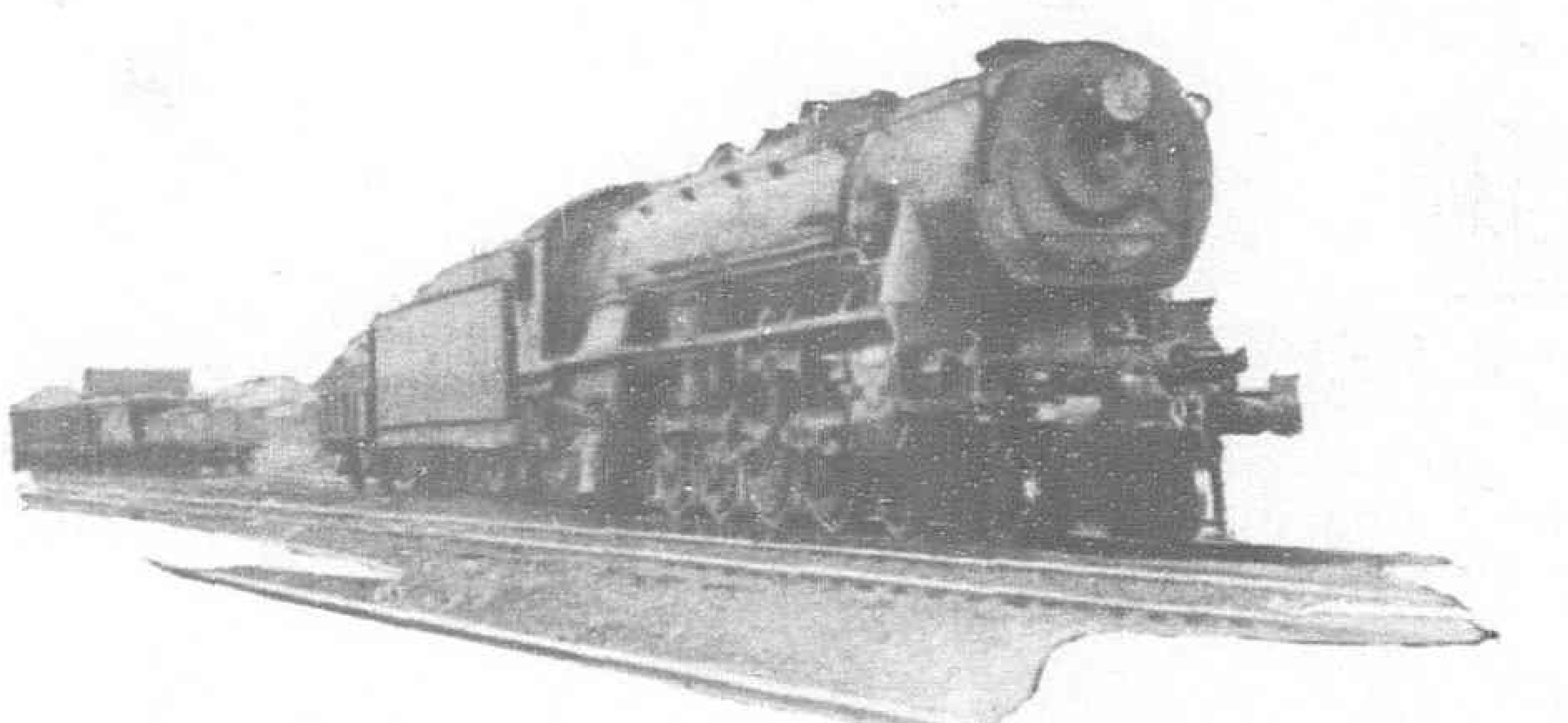
The auxiliary machinery is all electrically driven, with the exception of the pumps attached to the main engines, and the necessary current is supplied by four Diesel generating sets arranged on either side, next to the main engines. Each of the three larger sets consists of a six-cylinder Sulzer two-cycle engine of 780 h.p. running at 180 revs. per min. and direct coupled to a continuous-current compound dynamo for 220 volts. The Diesel engines are fitted with a double-acting scavenging air pump and a three-stage compressor with cranks set at 180 degrees, this arrangement ensuring good balance and smooth running. The output of the compressors is more than sufficient, so that they can, if necessary, supply starting air for the main engines. The pumps for fuel oil and lubricating oil are integral with the engines, and each aggregate has an electrically-driven pump for the cooling-water, delivering fresh water for cooling the cylinders and heads. The pistons are provided with oil cooling. The fourth aggregate is a 330-h.p. airless injection six-cylinder Sulzer two-cycle engine running at 330 revs. per min., direct coupled to a continuous current dynamo for 220 volts; it also drives through a friction clutch a Sulzer compressor for 70 atm. (1,000 lb./sq. in.) with four three-stage cylinders. There is also an emergency compressor set provided, comprising a 6-h. p. single-cylinder hot-bulb Sulzer engine running at 450 revs. per min. and fitted with a two-stage compressor cylinder; this set delivers the starting air required when starting the large auxiliary engines for the first time. There are twenty injection air bottles, each with a capacity of 800 liters, in the engine room, and also two starting-air tanks, each having a capacity of 920 cub. ft.

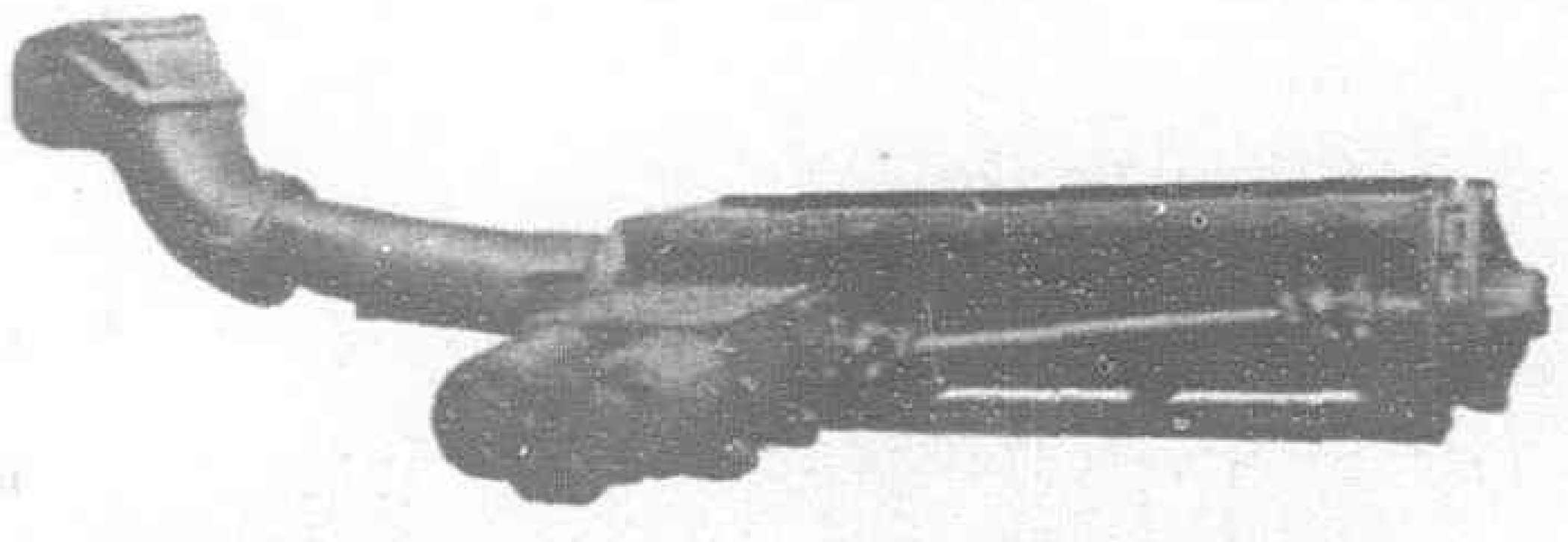
The Diesel dynamo sets are connected to the main switchboard which is fitted at the front end of the engine room and in close proximity to the control platforms for the main engines; the result of such an arrangement is that attendance to the machinery installation is very much simplified. The connections from the switchboard are split into two groups, the first of which comprises all those necessary for the operation of the ship, whilst the second consists of all others which can be switched off temporarily without interfering with the vessel's operation. The Diesel dynamos are connected in parallel, and as soon as a dynamo is cut out, the second group of connections referred to above is automatically cut out also, thus preventing the dynamos still in service being overloaded. There is also a three-phase 110-volt circuit, in addition to the main 220-volt circuit; the fans in the cold rooms and bathrooms are connected to the three-phase circuit. The three-phase current is generated by two groups of rotary transformers in the engine room, one of which serves as a reserve unit; each transformer group comprises a direct-current motor, a 40-k.w. three-phase generator for 110 volts, and a 1-k.w. generator for direct current at 20 volts; the 20-volt generator supplies current for the electric bell system all over the ship. In addition to the connections for the dynamos, there are separate panels on the switchboard for the blowers, the motors for the cooling-water pumps, the lubricating oil pumps, the auxiliary deck machinery and the refrigerating plant, as well as the lighting system, heating system and the motors for ventilating purposes. Of the electrically-driven auxiliary machines, the pumps for the cooling-water will first be described. Two Sulzer centrifugal pumps, one of which serves as a reserve unit, with two stages for 1.5 atm. and 4.5 atm. respectively, supply sea water from their first stage to the fresh-water coolers, whilst the second stage delivers the sea water for cooling the pistons of the main engines. A special pump, which also serves as a bilge pump, pumps the cooling-water from the pistons overboard. Two fresh-water pumps, one of which is a reserve, circulate the fresh water for cooling; they draw from the three fresh-water coolers arranged one behind the other and deliver water to the cylinder jackets and heads of the main engines. The engine room also contains ballast pumps for 250 tons per hour, pumps for deck washing and bilge purposes for 150 tons per hour; pumps for bath water, which deliver water to high-level tanks for the baths; hot-water pumps for circulating the water in the hot-water system, as well as pumps for discharging the waste water from the lavatory pumps overboard.

In addition to the cooling-water system, the lubricating oil system forms an important unit in the Diesel engine plant. There are two sets of lubricating oil pumps provided between the main engines, each consisting of two rotary pumps—a small one for crosshead lubrication, and a larger one for general lubrication—each being driven by an electric motor of 70 h.p. running at 900 revolutions per minute. The pumps draw oil from the sumps of the main engines and from the lubricating oil tank in the double bottom of the ship. The smaller pumps force the oil through filters and supply the various lubricating points of the driving gear direct, whilst the larger ones deliver through filters to a high-level tank, from which the oil flows to all the points connected up to the main lubricating system. The bearings of the blowers are connected to the general lubricating system, as well as the filling tanks of the two centrifugals employed for cleaning the lubricating oil from the main engines. The auxiliary engines drive their own lubricating oil pumps direct, the pumps circulating the lubricating oil in a closed circuit from the sumps to the lubrication points, these points being also connected, as a reserve, to a special piping system with an auxiliary pump, this pump in turn supplying the storage tanks and the tank over the two centrifugals for cleaning the lubricating oil from the auxiliary engines. When undergoing the cleaning process, the lubricating oil from the main engines is heated before passing into the centrifugals; two of the four lubricating oil centrifugals serve as reserve units.

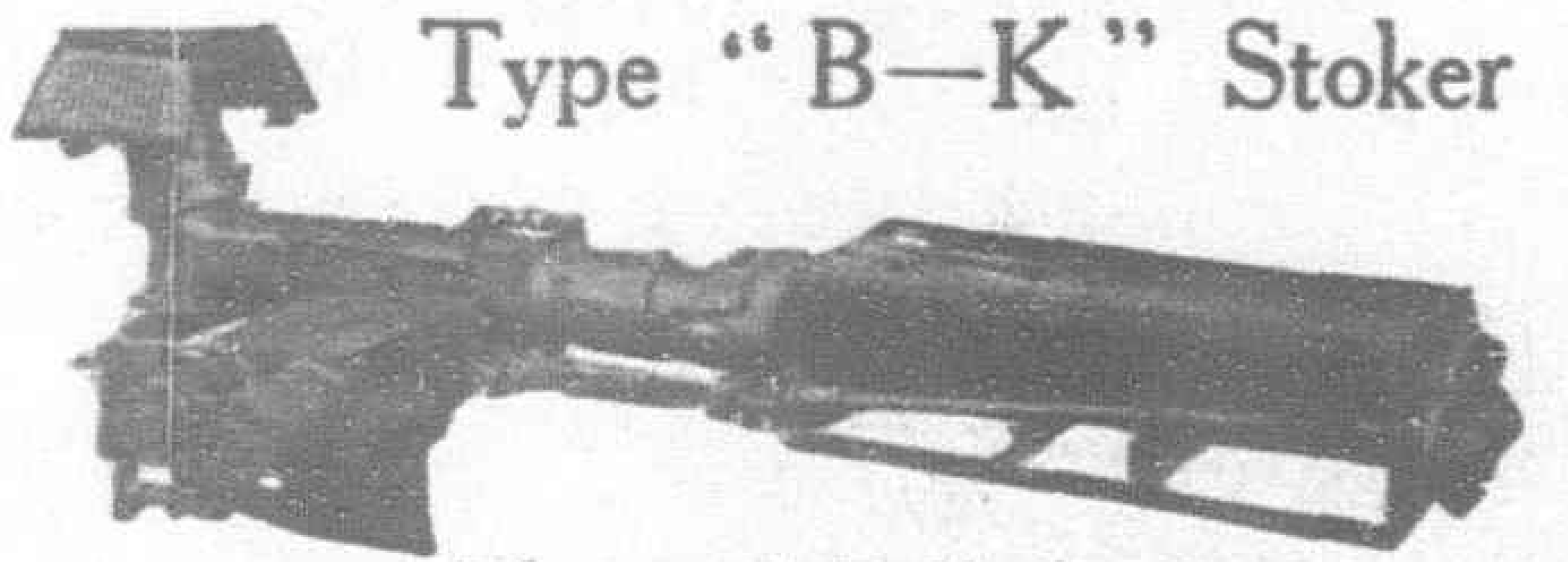
The refrigerating plant on the *Johan van Oldenbarnevelt* comprises two two-stage Sulzer ammonia compressors installed in a room on the port side, they work on the dry system and have a rated capacity of 240,000 B. Th. U. per hour each at an evaporation temperature of 15°C and a cooling-water temperature of +32°C. There is no intermediate cooling between the stages by means of injection of ammonia, although receiver cooling is provided for use in case working conditions are unfavorable. The compressors, one of which serves as a stand-by, are each direct-coupled to a 50-h.p. electric motor, the speed of which can be regulated to any figure between 320 and 160 revs. per min. in order to vary the refrigerating capacity as required. The two-stage arrangement, the disc valves, the use of metallic packing, the totally-enclosed method of construction and the forced lubrication used on Sulzer compressors, are all features which help to render such high speeds possible. The plant is consequently low in weight and takes up only a small amount of space—desiderata which are of great importance when dealing with marine installations.

In the same room as the compressors, there are also the condensers and the accumulator bottle for taking up surplus ammonia, as well as the distributing station and the brine cooler with the brine pumps. One of the two condensers serves as a stand-by.





Type "B—K" Stoker



Type "B" Stoker

Hand Firing of Low Grade Fuel is Difficult

ECONOMICAL firing of lower grades of fuel necessitates a thin fire and sprinkling the coal over the fire just as fast as burned.

To do this by hand would mean keeping the fire door open almost continuously thereby admitting too much steam killing cold air and even then would be next to impossible for the fireman to maintain maximum steam pressure.

Application of a mechanical stoker permits successful use of any grade of fuel.

In addition it will insure full locomotive capacity.

The Standard Stoker Company, Inc.

NEW YORK CHICAGO ERIE

Eastern Agent: **MAJOR GEORGE E. SPENGLER, 1 Ting Yin Hutung, Peking, China**

Each condenser is constructed on the tubular system, and operates on the counter-current principle. The liquid ammonia from the condensers passes through the accumulator bottle to the distributing station, from which pipes run to the brine cooler, the cold rooms, the thermo tank and the ice-making plant and ice store, a regulating valve being fitted in each pipe line.

The brine cooler is in two parts and is worked by direct ammonia injection from the distributing station, as well as by flooding from the central liquid separator in the thermo tank room. The brine is used for cooling the various refrigerated cupboards in the pantries and kitchens, and also the fresh-water coolers, which can reduce the temperature of the water from +32°C to +3°C and deal with quantities up to 1,320 gallons daily. The brine distributing piping forms a separate closed system through which the brine is circulated by means of centrifugal pumps.

The cold rooms are situated on H-deck, and are used mainly for storing the ship's provisions, although three rooms can be used for refrigerated cargo. The total amount of refrigerated space on the ship is 19,000 cub. ft.

An ice-making plant is provided in front of the cold rooms, its output being one ton of opaque ice per day ; it consists of two insulated tanks for taking the ice cans. Each tank has a cooling coil with a regulating valve and suction junction, and is filled with brine which is circulated by means of a pump. After extracting the ice cans, they are dipped into a thawing tank in order to loosen the blocks of ice. The blocks are then sent to the ice store.

Trial Trip

The trial trip took place in the North Sea, and the ship attained a speed of 19.2 knots over the measured mile, *i.e.* 1.2 knots in excess of the stipulated speed. With the exception of a brief period when speed had to be reduced owing to thick fog, the engines were operating during the whole period of two days on the trial trip at full power, and for some time at overload, when no vibration was noticeable. Fuel consumption trials, which are always difficult to undertake on trial trips, were not made, but, in this connection it should be mentioned that the fuel consumption at the acceptance tests of the engines was 169-170 grams (0.372-0.374 lb.) per B.H.P.-hour at an output of 7,100 h.p. and 100 revs. per min., taken on the output of the main engine, without any allowance for the blower. The fresh-water cooling arrangements worked admirably, and the coolers proved to be of ample size, as the sea-water cooling pumps had to be throttled. The performance of the exhaust-gas boiler is also noteworthy, as, when the engines were working at overload, full pressure was raised in the boiler after fifteen minutes, so that the safety valve set at 85 lb. per sq. in. started to blow off. The regulation of the generation of steam by adjusting the level of water in the exhaust-gas boiler is extremely simple. The refrigerating plant was also thoroughly tested.

On her first journey outwards the motorship *Johan van Oldenbarnevelt* was in collision with another vessel in the Canal from Amsterdam to the North Sea, and was damaged to such an extent that she had to return to Amsterdam. Notwithstanding the fact, however, that the ship had, in consequence, to commence her maiden voyage three days late, it was possible, owing to the excellent performance of the main engines, and by reducing the stops *en route*, for her to make up this loss of time by the time she arrived at Malta.

EISLER, REEVES & MURPHY
FED. INC., U.S.A.
CONSULTING ENGINEERS
MARINE & CARGO SURVEYORS
3 CANTON ROAD, SHANGHAI.

SURVEYORS TO :
AMERICAN BUREAU OF SHIPPING (AMERICAN LLOYD'S)
TEIKOKU KAIJI KYOKAI (THE IMPERIAL JAPANESE MARINE CORPORATION)
REGISTRO NAVALE
LOCAL UNDERWRITERS
INTERNATIONAL UNION OF MARINE INSURANCE
FAR EAST SUPERINTENDENCE CO., LTD.
UNITED STATES SALVAGE ASS., INC.
AMERICAN STEAMSHIP OWNERS P & I ASS'N
AMERICAN CONSULATE GENERAL

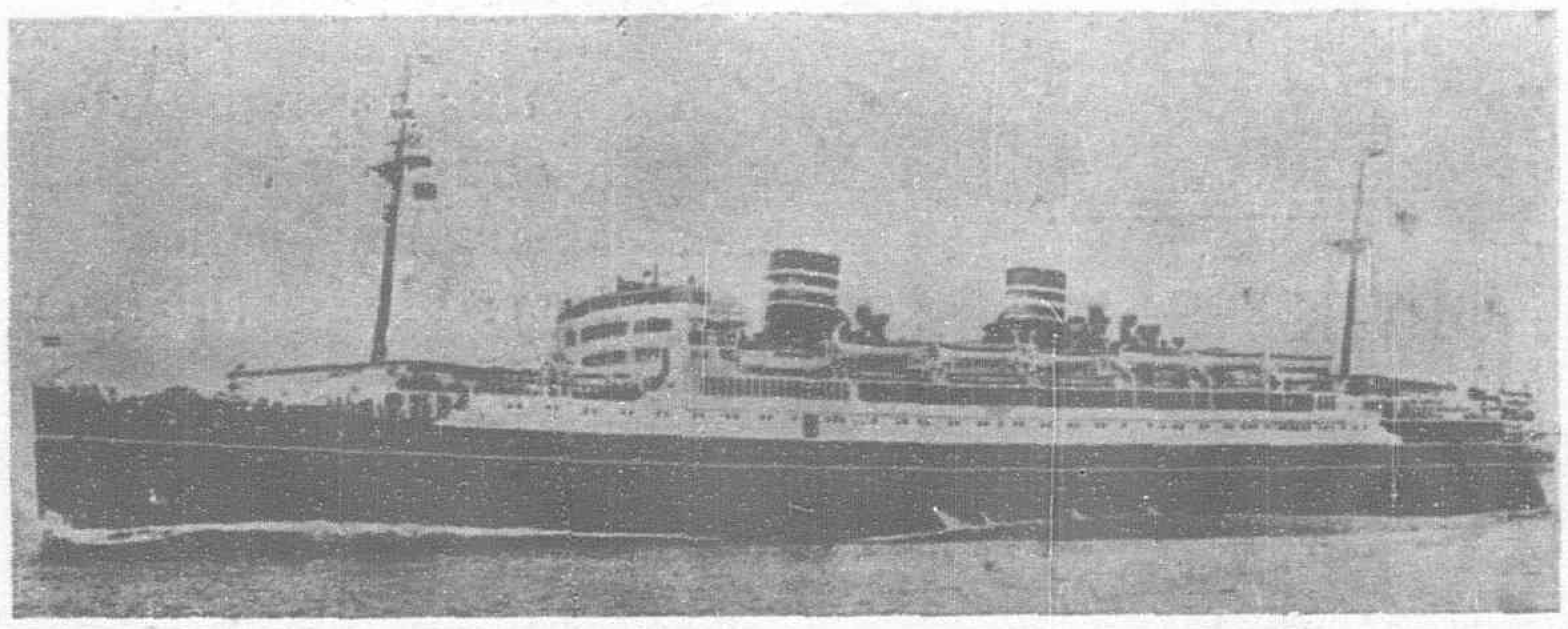
SULZER BROTHERS

SHANGHAI ENGINEERING OFFICE

4 AVENUE EDWARD VII.

Telegraphic Address
"SULZERBROS" SHANGHAI
Telephone 16512

蘇爾壽工程事務所
上海愛多亞路四號
本公司常備樣本供奉各界
垂詢工程事務亦曷誠酬答


N.Y.K. Motor Liner "Asama Maru" Propelled by Four 8-cylinder Sulzer Two-cycle Diesel Engines Totalling 16,000 B.H.P.

Other Products :

Steam Engines and Boilers, Air and Gas Compressors, Centrifugal Pumps and Fans, Borehole Pumps, Stationary and Marine Diesel Engines, Ice-making and Refrigerating Plants, Maag Gears and Maag Planing Machines.

WINTERTHUR. SWITZERLAND.